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MEMOIRS OF THE HOURGLASS CRUISES

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AMPHIPOD CRUSTACEA

I. FAMILY AORIDAE

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By

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ABSTRACT

Thirteen species of aorid amphipods [*Lembos tigrinus* Myers, *L. tempus* Myers, *L. spinicarpus inermis* Myers, *L. unicornis* Bynum and Fox, *L. unifasciatus reductus* Myers, *L. brunneomaculatus mackinneyi* Myers, *L. ovalipes* Myers, *L. smithi* (Holmes), *Microdeutopus myersi* Bynum and Fox, *Rildardanus laminosa* (Pearse), *Liocuna caeca* new genus and species, *Unciola serrata* Shoemaker and *Acuminodeutopus naglei* (Bousfield)] were collected during a 28-month sampling programme at ten stations (6-73 metres depth) along two east-west transects on the central West Florida Shelf. Two further species (*Lembos setosus* Myers and *L. rectangulatus* Myers), not collected during the Hourglass programme but collected subsequently in the survey area, are included in the review. These species are diagnosed and figured, and their bathymetric distribution within the study area discussed. Relationships of families within the superfamily Corophioidea are discussed, and a new family, Neomegamphopidae, is erected to include *Neomegamphopus*, *Konatopus*, *Maragopsis*, *Pseudomegamphopus* and *Varohios*. Zoogeographic analysis of Hourglass Aoridae revealed three species with Transhatteran affinities, seven species with West Atlantic Tropical affinities, and five species known only from the West Atlantic Warm-Temperate. None were strictly Carolinian species. Breeding cycles of selected species were investigated. *Lembos tigrinus* and *L. tempus* had breeding peaks between August and November, whereas *L. smithi* had a breeding peak between March and May.

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INTRODUCTION

Aoridae are domicolous (tube-building) Amphipoda belonging to the superfamily Corophioidea. They are important members of shallow benthic communities, particularly in tropical and warm-temperate regions, and a few species occur in intertidal and abyssal zones. Little is known concerning their ecology, but they appear to be both suspension and selective deposit feeders, probably gaining part of their nutritional requirements from benthic bacteria. The tubes in which they reside are constructed with an adhesive substance produced by glands in pereopods 3 and 4, which solidifies into a thread on contact with seawater. The thread which is emitted from a pore immediately behind the tip of the dactylus is woven into a tube by the dactyli. Various debris are usually incorporated into a tube.

This report is based on collections of the Hourglass Cruises on the central West Florida Shelf off Tampa Bay and Sanibel Island. Project Hourglass, a 28-month systematic sampling programme, was conducted by the Florida Department of Natural Resources Marine Research Laboratory and made use of the R/V *Hernan Cortez* for monthly sampling. The collections include thirteen species of Aoridae in the genera *Lembos*, *Microdeutopus*, *Rildardanus*, *Unciola*, *Liocuna*, and *Acuminodeutopus*. Two further species, restricted to the intertidal or nearshore subtidal and not represented in Hourglass samples, were subsequently collected in the region and included in this report. Four new species of Aoridae were recovered by the Hourglass Cruises, viz., *Lembos tigrinus*, *L. tempus*, and *L. ovalipes* described elsewhere (Myers, 1979) and *Liocuna caeca* described herein. Bathymetric distributions of all Hourglass Aoridae and known geographical distributions of the species are presented.

Many Aoridae have distinctive pigmentation patterns, though this character is rarely used as an aid to identification due to the fact that pigments tend to fade in preservatives, particularly in alcohols. Nevertheless, ecologists working with fresh material will find that the use of colour patterns will greatly facilitate sorting. Colour photographs of a few species obtained from living material by Dr. E. L. Bousfield and Mr. J. D. Thomas are reproduced herein. In addition, pigment patterns as seen in preserved material are described and may aid in the sorting of material preserved for a few years only. It should be noted, however, that the different pigments which often make up a complex pattern may fade at different rates, so that only parts of the pattern mosaic may persist in preserved material.

ACKNOWLEDGEMENTS

I would like to thank all personnel involved with Project Hourglass for obtaining the material on which this report is based. I am grateful to Dr. E. L. Bousfield for providing me with material from the collections of the Canadian National Museum and also for kindly permitting me to use the colour photographs reproduced herein. Mr. J. D. Thomas was responsible for the fine colour photographs of *L. unicornis*. Thanks are also due to Dr. C. Saloman and Mr. N. Gillies for material studied in the present work.

METHODS AND MATERIALS

The majority of aorids examined were obtained from the collections of the Hourglass Cruises. Complete descriptions of stations, sampling gear and methods, as well as hydrographic data, have already been published in this series (Joyce and Williams, 1969). For convenience, a list of stations (Table 1) and a map of the study area (Figure 1) are provided. Additional material was examined from the collections of the National Museum of Natural Sciences, Ottawa, Canada (NMC). This consisted

TABLE 1. LOCATIONS AND DEPTHS OF HOURGLASS STATIONS PRODUCING AORIDS.

Station	Latitude*	Longitude*	Established Depth (metres)	Approximate Nautical Miles Offshore*
A	27°35′N	82°50′W	6.1	4, due W of Egmont Key
B	27°37′N	83°07′W	18.3	19, due W of Egmont Key
C	27°37′N	83°28′W	36.6	38, due W of Egmont Key
D	27°37′N	83°58′W	54.9	65, due W of Egmont Key
E	27°37′N	84°13′W	73.2	78, due W of Egmont Key
I	26°24′N	82°06′W	6.1	4, due W of Sanibel Island Light
J	26°24′N	82°28′W	18.3	24, due W of Sanibel Island Light
K	26°24′N	82°58′W	36.6	51, due W of Sanibel Island Light
L	26°24′N	83°22′W	54.9	73, due W of Sanibel Island Light
M	26°26′N	83°43′W	73.2	92, due W of Sanibel Island Light
N**	27°03′N	83°14′W	39.0	42, due W of Venice

*U. S. Coast and Geodetic Chart No. 1003, dated June 1966.
**Trap station.

of material collected from the Hourglass study area by Mr. D. K. Camp and Dr. E. L. Bousfield with the principle aim of obtaining additional perfect material of certain groups for taxonomic analysis, as well as various samples from other locations in Florida and Alabama. Further material from Anclote Anchorage and St. Andrew Bay, provided by Mr. N. Gillies and Dr. C. Saloman, respectively, was also studied.

Holotypes and, where available, allotypes are deposited in the U. S. National Museum of Natural History, Washington, D. C. (USNM), and the NMC; paratypes are deposited in the USNM, the Museo Civico di Storia Naturale, Verona, Italy (MV), and in my own collection (AAM). Additional paratypes and all other Hourglass materials are deposited in the Invertebrate Reference Collection, Marine Research Laboratory, Florida Department of Natural Resources (FSBC I).

All measurements are in millimetres and are from the tip of the rostrum to the tip of the telson, measured with the animal in a straight (nonreflexed) position. Pereopods are numbered 1-7, the first two pereopods being termed gnathopods 1 and 2.

Each *Material examined* section is arranged first by station, then by chronological order of capture, and finally by method of capture on each date for easier retrieval of certain information during future analyses of Hourglass collections. Numbers of specimens captured each month at each station are presented in Appendix I.

All drawings were made with the aid of a drawing tube attached to a binocular compound microscope.

SYSTEMATICS

Apart from earlier works by the writer (Myers, 1977a, 1977b, 1978, 1979a) on the genus *Lembos*, no systematic account of Aoridae of the tropical and warm-temperate West Atlantic has been carried out, although a few species have been described within broader works (Pearse, 1912; Stephensen, 1933, 1948; Shoemaker, 1945, 1948; Myers, 1969; Bynum and Fox, 1977).

The highly polythetic nature of the Corophioidea (sensu Barnard, 1973) led Barnard (1973) to

Figure 1. Hourglass cruise pattern and station locations.

unite four established families, the Aoridae, Corophiidae, Isaeidae, and Photidae into a single family, the Corophiidae. This fusion has not been universally accepted (Bousfield, 1973, 1978; Myers, 1974a), although no alternative phylogenetic classification has been proposed. The following classification is put forward in the hope that it will stimulate further research and discussion on corophioidean relationships.

It is postulated that the hypothetical ancestral corophioidean would have had the following

characteristics: an unmodified head without extended ocular lobes or subocular cephalic regression, two pairs of similar, slender antennae, a three-articulate mandibular palp, well developed inner lobes to the maxilla 1 and maxilliped, coxae of moderate size, two pairs of similar, weakly subchelate gnathopoda, two pairs of glandular pereopods, three pairs of non-glandular simple pereopods, free and unflattened urosomites, biramous uropods, and a fleshy telson as broad as it was long.

The loss of one ramus of a biramous appendage and the loss of podomeres from a uniramous appendage has occurred repeatedly in crustacean evolution, and the loss of a uropod ramus or of an accessory flagellum from the antennule is thus of doubtful phylogenetic significance in Amphipoda.

No extant genus of corophioidean exhibits all the above primitive features, in an unmodified state, but genera such as *Protomedeia* and the more primitive members of *Gammaropsis* (sensu Krapp-Schickel and Myers, 1979) approximate this condition.

From the hypothetical primitive condition outlined above, several tendencies can be discerned in living forms. These include lateral extension of the ocular cephalic margin, generally coupled with regression of the subocular cephalic margin, thickening of antenna 2 peduncle, leading to a subpediform state, enlargement of one pair of gnathopoda, generally in males only, and increase or decrease in the size of the coxae.

Barnard (1973) postulated an enlarged and dominant gnathopod 2 in the basic, primitive corophioidean and derived aorids with enlarged gnathopod 1 by a "simple reversal mutation in the axial genetic systems of the organism". If this were the case, corophioideans with both pairs of gnathopoda weakly developed, such as *Camacho*, *Aorcho* and deep-sea *Lembos*, would have to be considered degenerate. In general, evidence from a number of marine animal groups suggests that the oldest faunal elements are to be found in archibenthal regions (Menzies et al., 1973), and it seems more likely, therefore, that these deep-sea corophioideans are primitive rather than degenerate. The writer also finds it difficult to accept the possibility that such a "reversal mutation" could have occurred several times independently as suggested by Barnard (1973), e.g., in the derivation of *Erichthonius* from a member of the *Microdeutopus* group, of *Lembos* from *Protomedeia,* and of *Pseudomegamphopus* from *Gammaropsis*. It would seem more logical to postulate that the primitive corophioidean had, as described above, two pairs of weakly subchelate gnathopoda and that the enlargement of one or other pair occurred independently, probably on more than one occasion, in different evolutionary lines (Myers, 1973).

Whilst the writer agrees with Barnard (1973) that there is no evidence that axial reversal involving the complete regression of a formerly enlarged and dominate pair of gnathopoda to a simple subchelate state has occurred, there are examples of corophioideans in which gnathopod 1 has become so enlarged that it dominates a primarily enlarged gnathopod 2 (*Aloiloi*, *Ledoyerella*). The presence in the females of these two genera of an enlarged and dominating gnathopod 2 supports the contention that the dominance of gnathopod 1 in the males is a secondary occurrence.

The function of the enlarged gnathopoda of corophioideans is poorly known. In certain aorids, the enlarged gnathopod 1 may almost equal the length of the entire animal. The enormous expenditure of energy in producing such structures and the attendant reduction in mobility which their ownership confers clearly points to their fundamental importance. The uniformity of the structure of the first pair of gnathopoda in the females of many aorid genera, coupled with the high specific complexity of the male gnathopoda, suggest a sexual recognition character, possibly an I.R.M. for satisfactory copulation. If so, however, the development of one gnathopod of the pair would be sufficient (cf. crabs of genus *Uca*). Whatever the function of the enlarged pair, it is important to note that the function of the

smaller pair may depend upon their position. In those species having an enlarged gnathopod 2, the first (and smaller) pair often function as accessory manipulatory mouthparts, whilst in those with the first pair of gnathopoda enlarged, the second gnathopoda are more often used as a filtering apparatus, in tube building, or in grasping the female during copulation. They may, in certain cases however, aid in food manipulation, by being thrust forward between the bases of the first pair of gnathopoda to a forward position. Since a change in the axial gradient may involve changes in several aspects of the biology of the species, it is reasonable to assume that the development of either axial gradient has been a conservative event. Whilst there may have been several early experiments, once established, recurring axial reversals seem unlikely.

The hypothesis is put forward here that a basic dichotomy occurred in primitive corophioideans in relation to the structure of the head and its appendages. In a domicolous animal, the greatest environmental pressures will be on the exposed (in this case head) region. In one line, both pairs of antennae retained a sensory function, becoming elongate and slender to extend the range for collection of sensory information around the habitation without the necessity for exposure of the body. In the other line, the first pair of antennae retained their sensory function, but the second pair lost their sensory function, became shorter and stouter and functioned in food gathering, being used to pull food particles towards the tube, and possibly also to scrape surface deposits. *Gammaropsis* appears to be a primitive member of the first line, *Protomedeia* a primitive representative of the second line. These two genera both exhibit an enlarged second gnathopod pair in the male, and it is postulated that these are independent events, and that both lines also produced forms with an enlarged first pair of gnathopoda in males. These are represented today by neomegamphopids (first line) and aorids (second line). These ideas are represented diagrammatically in Figure 2.

Bousfield (1978), in his revised classification of Amphipoda, included 9 families in the superfamily Corophioidea. Five families are well established (Ischyroceridae, Ampithoidae, Biancolinidae, Cheluridae and Podoceridae) and are not considered further here. They are well diagnosed by Barnard (1973). Of the remaining four families, i.e., those included in the single family Corophiidae by Barnard (1973), the Corophiidae and Aoridae are herein retained, and the Isaeidae and Photidae remain merged. In addition, a new family, Neomegamphopidae Fam. nov., is herein erected. These families are diagnosed below.

Family Corophiidae Dana, 1849

Corophiidae Dana, 1849, p. 139.

Diagnosis: Body smooth, urosome depressed, segments tending to fusion. Coxae short, shallow, noncontiguous. Head shape sometimes sexually dimorphic. Rostrum often distinct; subocular cephalic margin often deeply recessed for insertion of enlarged peduncle of antenna 2; eye lobes moderately extended, obtuse. Antenna 1 shorter or equal in length to antenna 2, lightly or strongly setiferous, primary flagellum variable in length, accessory flagellum absent; antenna 2 peduncle articles 3-5 often enlarged especially in male, flagellum short, articles tending to fusion. Labrum notched, epistome slightly produced anteriorly. Labium with distinct inner lobes, mandibular processes short. Mandible molar strong; palp weak, 1-, 2- or 3-articulate. Maxilla 1 inner plate small, asetiferous, outer plate with 7 spines, palp large. Maxilla 2 with inner and outer plates well developed. Maxilliped plates strong. Gnathopod 2 larger than gnathopod 1, subchelate. Pereopods 3 and 4 basis expanded; article 5 usually overhung by article 4; dactyls with gland ducts. Pereopods 5-7 slender; pereopod 7 longest. Pleopods short, peduncle tending to inward expansion. Uropods 1 and 2 slender; uropod 1 peduncle often with distoventral lamellate process, rami generally subequal. Uropod 3 short,

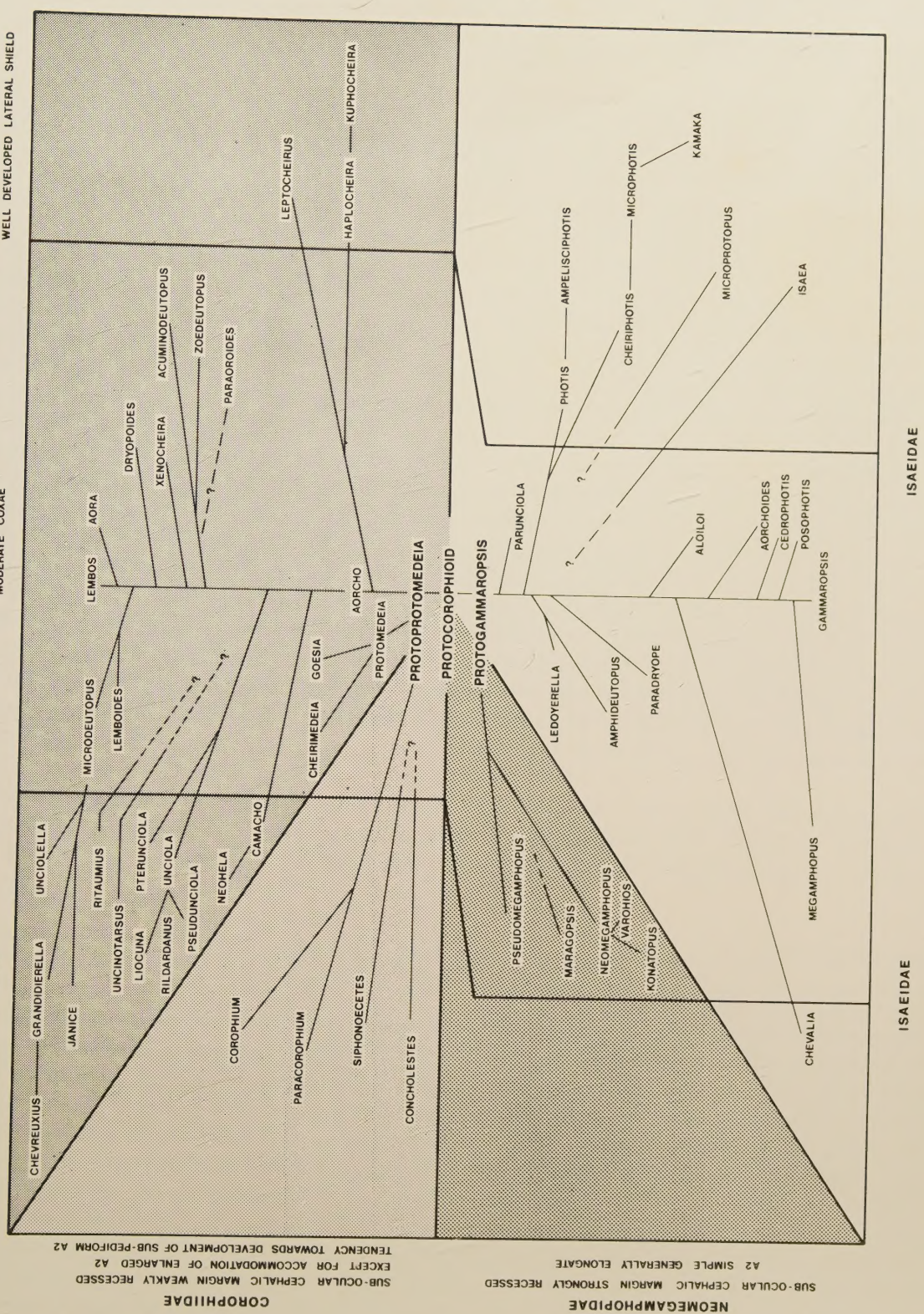

Figure 2. Hypothetical pattern of relationships of the Aoridae, Corophiidae, Isaeidae, and Neomegamphopidae.

usually uniramous; ramus generally shorter than peduncle. Telson short, thick, fleshy, entire. Coxal branchiae sac-like on pereon segments 3-6, occasionally on 7. Oostegites narrow, smallest on segment 2, largest on segment 5.

Component genera: *Concholestes*, *Corophium*, *Paracorophium*, *Siphonoecetes*.

Family Isaeidae Dana, 1853

Isaeidae Dana, 1853, p. 913.

Diagnosis: Body smooth. Coxae usually deep, rarely shallow, often ventrally setose; coxae 2-5 often largest; coxa 4 not excavate behind; coxa 5 with deep anterior lobe. Rostrum generally absent; head strongly recessed at insertion of antenna 2; eye lobes often extended, sometimes bearing eye on proximal or distal portion. Antennae subequal in length or antenna 2 longer; antennae elongate, slender, primary flagella often shorter than peduncles, frequently setose; antenna 2 never sexually dimorphic, accessory flagellum variable. Labrum ventral margin weakly excavate or notched, epistome often strongly produced, acute. Labium with distinct inner lobes, mandibular processes never attenuated. Mandible molar strong; palp slender, 3-articulate, article 3 generally spatulate, terminally setose. Maxilla 1 inner plate small with 1 to several apical setae, outer plate generally with 10 spines, palp large. Maxilla 2 with inner and outer plates well developed. Maxilliped plates strong. Gnathopod 2 subchelate, sexually dimorphic, always enlarged in male and generally larger than gnathopod 1. Pereopods 3 and 4 basis usually not expanded; dactyls with gland ducts. Pereopods 5-7 elongate; pereopod 7 slightly longer than pereopod 6. Pleopod peduncles normal. Uropods 1 and 2 slender; uropod 1 peduncle rarely with distoventral spine-like process, rami generally subequal. Uropod 3 sometimes projecting beyond uropods 1 and 2; peduncle often elongate; inner ramus tending to reduction, sometimes absent; terminal spines of rami simple. Telson short, thick, fleshy, entire, sometimes with dorsolateral crests. Coxal branchiae sac-like on pereon segments 2-6. Oostegites large, laminar, smallest on segment 5.

Component genera: *Aloiloi*, *Ampelisciphotis* (= *Gaviota*), *Amphideutopus*, *Aorchoides*, *Cedrophotis*, *Cheiriphotis*, *Chevalia*, *Gammaropsis* (sensu lato), *Isaea*, *Kamaka*, *Ledoyerella*, *Megamphopus*, *Microphotis*, *Microprotopus*, *Paradryope*, *Parunciola*, *Photis* (= *Cerapopsis*), *Posophotis*.

Neomegamphopidae, new family

Diagnosis: Body smooth. Coxae moderately deep, weakly setiferous; coxae 2-4 largest; coxa 4 not excavate behind; coxa 5 with deep anterior lobe. Rostrum absent; head strongly recessed at insertion of antenna 2; eye lobes extended, bearing eye on proximal or distal portion. Antennae subequal in length; peduncles elongate, slender; primary flagella shorter than peduncles, especially on antenna 2; accessory flagellum variable; antenna 2 never sexually dimorphic. Labrum ventral margin rounded or weakly excavate. Labium with distinct inner lobes, mandibular processes short. Mandible molar strong; palp slender, 3-articulate, article 3 spatulate or ovoid, terminally setose. Maxilla 1 inner plate small, with 1 to several setae; outer plate generally with 10 spines, palp large. Maxilla 2 with inner and outer plates well developed. Maxilliped plates strong. Gnathopod 1 sexually dimorphic, always enlarged and larger than sexually monomorphic gnathopod 2, often complexly subchelate; article 7 rarely missing. Pereopods 3 and 4 basis not expanded; dactylus with gland ducts. Pereopods 5-7 elongate; pereopod 7 longest. Pleopod peduncles normal. Uropods 1 and 2 slender; uropod 1

sometimes with distoventral spine-like process, rami generally subequal. Uropod 3 sometimes projecting beyond uropods 1 and 2; peduncle short; inner ramus tending to reduction; terminal spines of rami simple. Telson short, thick, fleshy, entire, often with weak dorsolateral crests. Coxal branchiae sac-like on pereon segments 2-6. Oostegites large, laminar, smallest on segment 5.

Component genera: *Konatopus*, *Maragopsis*, *Neomegamphopus*, *Pseudomegamphopus*, *Varohios*.

Remarks: This family is erected to include a clearly defined group of genera which has long caused confusion to systematists by the apparent mixture of aorid and isaeid characters which its members exhibit. The closest phylogenetic affinity of this group is with the Isaeidae, the only apparent affinity with the Aoridae being the development of an enlarged gnathopod 1 in the males. It has been postulated earlier (p. 6) that the secondary sexual enlargement of gnathopod 1 occurred independently in both protoprotomedeid and protogammaropsis lines. On this hypothesis there is no requirement to postulate an aorid relationship of neomegamphopids. The suggestion of multiple evolutionary reversals (Barnard, 1973) is rejected, and all corophioideans with protogammaropsis head structure (see previous discussion) bearing complex male gnathopod 1 and primitive unmodified gnathopod 2 are placed in the family Neomegamphopidae. Isaeid genera such as *Amphideutopus* and *Ledoyerella,* whilst exhibiting an enlarged gnathopod 1 in males, also possess an enlarged, complexly subchelate gnathopod 2. The enlargement of gnathopod 1 is a secondary development, a hypothesis supported by the fact that in females, gnathopod 2 is larger than gnathopod 1. At present, no neomegamphopid is known to have an enlarged gnathopod 2, but should genera or species be described which possess an enlarged gnathopod 2, they should not be excluded from the Neomegamphopidae, but the family diagnosis should be modified to include them (a parallel can be seen in the Aoridae where certain genera, e.g., *Microdeutopus* and a new genus "in press" elsewhere, include species with an enlarged male gnathopod 2). It is theoretically possible for a neomegamphopid to have a gnathopod 2 secondarily enlarged so as to dominate the primarily enlarged gnathopod 1. Such a neomegamphopid would in practice be difficult to distinguish from an isaeid. However, the axial gradient is so well established in isaeids that the females generally have gnathopod 2 larger than gnathopod 1 and thus indicate their origins. Neomegamphopidae, on the other hand, show little evidence of an axial gradient in the females.

Family Aoridae Stebbing, 1899

Aoridae Stebbing, 1899, p. 211.

Diagnosis: Body usually smooth, often with midventral sternal processes in male. Coxae variable, sometimes very reduced and noncontiguous, occasionally forming well developed lateral shield; coxa 1 generally largest, occasionally reduced; coxa 4 not excavate behind; coxa 5 anterior lobe deeper. Rostrum generally absent or short; head only moderately recessed at insertion of antenna 2, but subocular cephalic margin sometimes excavated to allow insertion of enlarged antenna 2 peduncle; eye lobes obtuse or acute, never extended. Antenna 1 longer than or equal in length to antenna 2, lightly setiferous, primary flagellum usually longer than peduncle, accessory flagellum usually present, variable; antenna 2 peduncle tending to enlargement, often showing sexual dimorphism. Labrum ventral margin rounded or weakly excavate. Labium with distinct inner lobes, mandibular processes attenuated. Mandible molar strong; palp slender, 3-articulate, article 3 generally narrowest distally or rod-shaped. Maxilla 1 inner plate small, occasionally elongate, with reduction of setae to 0-2, outer plate generally with 10 spines, palp large. Maxilla 2 with inner and outer plates well developed. Maxilliped plates strong. Gnathopod 1 generally larger than gnathopod 2, especially in male, often complexly subchelate. Pereopods 3 and 4 basis usually not expanded; dactyls with gland ducts.

Pereopods 5-7 slender; pereopod 7 longest. Pleopod peduncles normal, often with coupling spines; outer ramus with basal article occasionally expanded. Uropods 1 and 2 slender; peduncle often with distoventral spine-like process; rami generally subequal. Uropod 3 rarely projecting beyond uropods 1 and 2; peduncle short; inner ramus tending to reduction, sometimes absent; terminal spines of rami simple. Telson short, thick, fleshy, entire, often with dorsolateral crests. Coxal branchiae sac-like on pereon segments 2-6. Oostegites large, laminar, smallest on segment 5.

Component genera: *Acuminodeutopus* (=*Rudilemboides*), *Aora* (=*Aoroides*), *Aorcho*, *Camacho*, *Chevreuxius*, *Cheirimedeia*, *Dryopoides*, *Grandidierella* (=*Neomicrodeutopus*), *Goesia*, *Haplocheira*, *Janice*, *Kuphocheira*, *Lembos* (=*Lembopsis*), *Lemboides*, *Leptocheirus*, *Liocuna*, *Microdeutopus*, *Neohela*, *Paraoroides*, *Protomedeia*, *Pseudunciola*, *Pterunciola*, *Rildardanus*, *Ritaumius*, *Unciola*, *Unciolella*, *Uncinotarsus*, *Xenocheira*, *Zoedeutopus*.

KEY TO THE GENERA OF AORIDAE OF THE WEST FLORIDA SHELF AND ADJACENT REGIONS

1. Uropod 3 lacking rami ..... *Liocuna*, new genus
1. Uropod 3 with one or two rami 2
2. Uropod 3 uniramous 3
2. Uropod 3 biramous 5
3. Antenna 2 peduncular articles not greatly expanded; male gnathopod 1 carpus larger than propodus ..... *Grandidierella*
3. Antenna 2 peduncular articles 3-4 greatly expanded; male gnathopod 1 propodus larger than carpus 4
4. Uropod 3 peduncle with inner-distal extension ..... *Unciola*
4. Uropod 3 peduncle lacking inner-distal extension ..... *Rildardanus*
5. Eye lobes acute ..... *Acuminodeutopus*
5. Eye lobes obtuse 6
6. Male gnathopod 1 with carpus larger than propodus; female coxa 1 anteroventral corner strongly produced forward ..... *Microdeutopus*
6. Male gnathopod 1 with propodus larger than carpus; female coxa 1 anteroventral corner not produced or very weakly projecting forward ..... *Lembos*

Genus *Lembos* Bate, 1856

Lembos Bate, 1856, p. 58.

(For recent work on this genus see: Barnard, 1965, 1970, 1979; Ledoyer, 1972, 1978; Myers, 1974b, 1975a, 1975b, 1976, 1977a, 1977b, 1978, 1979a, 1979b; and Sivaprakasam, 1970).

Diagnosis: Coxae moderately developed. Eye lobes obtuse. Mandibular palp 3-articulate; article 3 narrowest distally. Gnathopod 1 larger than 2, especially in male; propodus equal to or larger than carpus, generally bearing teeth in male, occasionally in females; carpus rarely with teeth. Uropod 3 biramous.

Remarks: *Lembos* species, like all gammarideans, are benthic recruiters, lacking a planktonic dispersal phase. Populations are thus more readily isolated by relatively minor ecological barriers, and hence more prone to subspeciation than are planktonic dispersers. That so few species of gammarideans have been recorded as polytypic is probably a reflection of the relatively unsophisticated state of amphipod taxonomy.

The genus *Lembos* is incompletely known from the Gulf of Mexico, both in relation to the number of species and to the intraspecific geographical variation of the described species. The diagnoses presented herein should facilitate the identification of most Northern Gulf species, but in the case of difficulty, the reader is strongly advised to consult the more detailed descriptions and figures in Myers (1977a, 1977b, 1978, 1979a).

TABLE 2. IDENTIFICATION CHARACTERS OF MALE *Lembos* SPECIES LACKING ANTENNAE AND PEREOPODS.

Species	Pigmentation Pattern	Maximum Length (mm)	Mid-Ventral Sternal Processes	Eye*	Mandibular palp article 3 length: breadth ratio	Uropod 3 peduncle: endopodite ratio
Lembos tigrinus	Double bands on seg 2-4 ± 5	5.0	Forward facing	Medium	6:1	1:2
Lembos tempus	Diffuse or irregular	6.0	Forward facing	Large	5:1	2:3
Lembos spinicarpus	Stellate spots	6.0	Forward facing	Medium	5:1	4:7
Lembos foresti	Diffuse	8.0	Absent	Small	4:1	2:3
Lembos unicornis	Single or double bands on segs 2-7 + pleon; head reticulate	6.0	Rear facing	Medium	5:1	1:2
Lembos ovalipes	Sparse fine spots	4.0	Forward facing or straight	Medium	5:1	1:3
Lembos unifasciatus	Single band of spots on seg 5	3.8	Forward facing or straight	Medium	4:1	3:4
Lembos dentischium	Double bands on segs 2-5	3.2	Forward facing	Medium	4:1	1:2
Lembos brunneomaculatus	Diffuse or irregular blotches	6.0	Absent or weak rounded process	Medium	5:1	2:3
Lembos kunkelae	Indistinct single bands	3.8	Forward facing	Medium	4:1	2:3
Lembos rectangulatus	Discrete spots	4.0	Forward facing	Medium	5:1	1:2
Lembos minimus	Bands on segs 3-4	3.0	Absent	Medium	3:1	6:7
Lembos setosus	Irregular	10.0	Forward facing	Small	5:1	1:3
Lembos smithi	Variable on segs 1-7 + pleon	5.5	Forward facing or straight	Medium	4:1	1:3

*Large eye has maximum diameter equal to half length of cephalon measured from interantennal margin to posterior dorsal region. Small eye has maximum diameter less than one-quarter length of cephalon.

KEY TO MALES OF *Lembos* SPECIES AND SUBSPECIES OF THE WEST FLORIDA SHELF AND ADJACENT REGIONS (ALSO SEE TABLE 2)

1. Gnathopod 2 carpus and propodus anterior margins with dense clothing of very long setae 2

1. Gnathopod 2 carpus and propodus anterior margins only weakly setiferous 12

2. Pereopods 3 and 4 basis, ischium and merus posterior margins strongly setose ..... *Lembos tempus* Myers

2. Pereopods 3 and 4 basis, ischium and merus with weak setation or, if strongly setose, long setae restricted to anterior margins of basis, merus and carpus 3

3. Pereopods 5-7 strongly setose 4

3. Pereopods 5-7 only moderately setiferous 7

4. Gnathopod 1 propodus inner face of anterior margin densely clothed in long setae 5

4. Gnathopod 1 propodus inner face of anterior margin only weakly setiferous 6

5. Gnathopod 1 carpus two-thirds length of propodus, pereopods 3 and 4 dactylus less than half length of propodus..... *Lembos brunneomaculatus brunneomaculatus* Myers

5. Gnathopod 1 carpus much less than half length of propodus, pereopods 3 and 4 dactylus equal in length to propodus ..... *Lembos brunneomaculatus mackinneyi* Myers

6. Coxae with long setae on lower margin, some of which equal to or longer than coxal depth ..... *Lembos minimus* Myers*

6. Coxae with short setae, much shorter than coxal depth..... *Lembos setosus* Myers

7. Gnathopod 1 propodus without palmar excavation..... *Lembos smithi* (Holmes)

7. Gnathopod 1 propodus with well-defined excavation separating posterodistal tooth from palm 8

8. Gnathopod 1 basis posterior margin with dense clothing of very long setae ..... *Lembos tigrinus* Myers

8. Gnathopod 1 basis posterior margin only weakly setiferous 9

9. Gnathopod 1 propodus with very deep palmar excavation, equal to half length of posterior margin 10

9. Gnathopod 1 propodus with relatively shallow palmar excavation, much less than half length of posterior margin 11

10. Gnathopod 1 carpus with strong posterodistal tooth, gnathopod 2 basis with weak, rounded anterodistal process ..... *Lembos spinicarpus spinicarpus* (Pearse)

10. Gnathopod 1 carpus with weak, triangular posterodistal tooth, gnathopod 2 basis with long, slender anterodistal tooth ..... *Lembos spinicarpus inermis* Myers

11. Gnathopod 2 merus with "brush" of very long setae ..... *Lembos ovalipes* Myers

11. Gnathopod 2 merus with only few long setae ..... *Lembos unicornis* Bynum and Fox

12. Gnathopod 2 carpus anteroproximal margin almost a right-angle ..... *Lembos rectangulatus* Myers

12. Gnathopod 2 carpus anteroproximal margin weakly convex 13

13. Large species reaching 7-8 mm; gnathopod 1 basis with stridulating ridges ..... *Lembos foresti* Mateus and Mateus*

13. Small species less than 4 mm; gnathopod 1 basis lacking stridulating ridges 14

14. Pereon segment 4 only, with dorsal pigment band; gnathopod 2 ischium lacking tooth on anterior margin 15

14. Pereon segments 2-5 with dorsal pigment bands; gnathopod 2 ischium with tooth on anterior margin 16

15. Uropod 1 peduncle with distal, ventral interramal process more than one-third length of peduncle ..... *Lembos unifasciatus unifasciatus* Myers

15. Uropod 1 peduncle with distal, ventral interramal process about one-sixth length of peduncle ..... *Lembos unifasciatus reductus* Myers

16. Gnathopod 1 palm finely crenulate ..... *Lembos kunkelae* Myers*

16. Gnathopod 1 palm smooth ..... *Lembos dentischium* Myers*

*Species not recorded from West Florida Shelf, but known from adjacent regions (Texas, tropical Florida and the Bahamas).

KEY TO FEMALES OF *Lembos* SPECIES OF THE WEST FLORIDA SHELF AND ADJACENT REGIONS

1. Uropod 3 longest ramus more than twice length of peduncle 2

1. Uropod 3 longest ramus less than twice length of peduncle 5

2. Uropod 2 interramal spiniform process one-quarter or less length of peduncle..... 3

2. Uropod 2 interramal spiniform process one-third or more length of peduncle 4

3. Gnathopod 1 palm sinuous ..... *Lembos tigrinus* Myers

3. Gnathopod 1 palm evenly rounded ..... *Lembos rectangulatus* Myers

4. Gnathopod 2 carpus and propodus subequal ..... *Lembos dentischium* Myers*

4. Gnathopod 2 carpus slightly shorter than propodus ..... *Lembos unicornis* Bynum and Fox

5. Uropod 2 interramal spiniform process more than two-thirds length of peduncle..... 6

5. Uropod 2 interramal spiniform process less than one-half length of peduncle 10

6. Head lateroventral corner very strongly produced; gnathopod 1 very enlarged, propodus subround ..... *Lembos smithi* (Holmes)

6. Head lateroventral corner only moderately produced; gnathopod 1 not markedly enlarged, propodus subrectangular or subovoid 7

7. Gnathopod 1 propodus scarcely longer than carpus..... *Lembos spinicarpus* (Pearse)

7. Gnathopod 1 propodus one and one-half times length of carpus..... 8

8. Mandibular palp article 3 short, less than three times as long as broad..... ..... *Lembos minimus* Myers*

8. Mandibular palp article 3 long, more than four times as long as broad 9

9. Uropod 3 peduncle with short, acute interramal process ..... *Lembos setosus* Myers

9. Uropod 3 peduncle lacking interramal process ..... *Lembos brunneomaculatus* Myers

10. Gnathopod 1 palm evenly rounded 11

10. Gnathopod 1 palm with defining tooth 12

11. Gnathopod 1 propodus more than one and one-half times length of carpus..... ..... *Lembos tempus* Myers

11. Gnathopod 1 propodus much less than one and one-half times length of carpus .... *Lembos unifasciatus* Myers

12. Coxa 1 deeper than broad..... *Lembos foresti* Mateus and Mateus*

12. Coxa 1 broader than deep..... *Lembos kunkelae* Myers*

*Species not recorded from West Florida Shelf, but known from adjacent regions (Texas, tropical Florida and the Bahamas).

Lembos tigrinus Myers, 1979

Figures 3, 4

Lembos tigrinus Myers, 1979a, pp. 221-227, figs. 171-174.

Material examined: HOURGLASS STATION B: 2♀ ; 2 March 1967; trawl; FSBC I 21712. — 1♂ ; 14 March 1967; trawl; FSBC I 21713. — HOURGLASS STATION D: 24♂, 34♀ ; 19 May 1966; trawl; FSBC I 21714. — 2♂, 1♀ ; 20 November 1966; trawl; FSBC I 21715. — 2♂, 1♀ ; 2 December 1966; trawl; FSBC I 21716. — 3♂; 14 December 1966; trawl; FSBC I 21717. — 4♂, 4♀ ; 6 February 1967; dredge; FSBC I 21718. — 5♂, 4♀ ; 6 February 1967; trawl; FSBC I 21719. — 1♂, 1♀ ; 28 February 1967; dredge; FSBC I 21720. — 1♂, 3♀ ; 28 February 1967; trawl; FSBC I 21721. — 1♀ ; 3 March 1967; dredge; FSBC I 21722. — 7♀ ; 3 March 1967; trawl; FSBC I 21723. — 2♂; 15 March 1967; dredge; FSBC I 21724. — 2♂, 5♀ ; 15 March 1967; trawl; FSBC I 21725. — 6♂;4 April 1967; dredge; FSBC I, 21726. — 1♂ , 1♀ ; 4 April 1967; trawl; FSBC I 21727. — 2♀ ; 12 April 1967; trawl; FSBC I 21728. — 1♂, 4♀ ; 12 May 1967; dredge; FSBC I 21729. — 2♂, 2♀ ; 12 May 1967; trawl; FSBC I 21730. — 4♂, 2♀ ; 21 May 1967; dredge; FSBC I 21731. — 1♂, 3♀ ; 3 June 1967; dredge; FSBC I 21732. — 5♂, 3♀ ; 3 June 1967; trawl; FSBC I 21733. — 4♂, 10♀ ; 21 June 1967; dredge; FSBC I 21734. — 2♂, 2♀ ; 21 June 1967; trawl; FSBC I 21735. — 7♂, 15♀ ; 2 August 1967; trawl; FSBC I 21736. — 3♂, 8♀ ; 25 August 1967; trawl; FSBC I 21737. — 2♂, 4♀ ; 1 September 1967; dredge; FSBC I 21738. — 57♂, 85♀ ; 1 September 1967; trawl; FSBC I 21739. — 1♂, 3♀ ; 12 September 1967; dredge; FSBC I 21740. — 3♀ ; 6 October 1967; dredge; FSBC I 21741. — 11♂, 34♀ ; 6 October 1967; trawl; FSBC I 21742. — 1♂, 2♀ ; 27 October 1967; dredge; FSBC I 21743. — 4♂, 10♀ ; 27 October 1967; trawl; FSBC I 21744. — 2♂; 3 November 1967; trawl; FSBC I 21745. — 5♂, 20♀ ; 21 November 1967; dredge; FSBC I 21746. — 4♂, 7♀ ; 21 November 1967; trawl; FSBC I 21747. — HOURGLASS STATION E: 1♀ ; 4 January 1966; dredge; FSBC I 21748. — 2♂; 8 February 1966; dredge; FSBC I 21749. — 1♂ ; 7 April 1966; trawl; FSBC I 21750. — 1♂; 19 July 1966; trawl; FSBC I 21751. — 1♀ ; 2 August 1966; trawl; FSBC I 21752. — 17♂, 38♀ ; 9 November 1966; trawl; FSBC I 21753. — 6♂, 11♀ ; 2 December 1966; dredge; FSBC I 21754. — 1♂, 8♀ ; 2 December 1966; trawl; FSBC I 21755. — 5♂, 6♀ ; 26 January 1967; trawl; FSBC I 21756. — 1♀ ; 6 February 1967; trawl; FSBC I 21757. — 5♂, 10♀ ; 3 March 1967; trawl; FSBC I 21758. — 1♂ , 1♀ ; 12 May 1967; dredge; FSBC I 21759. — 1♀ ; 3 June 1967; trawl; FSBC I 21760. — 11♂, 28♀ ; 2 August 1967; dredge; FSBC I 21761. — 3♂, 8♀ ; 2 August 1967; trawl; FSBC I 21762. — 8♂, 10♀ ; 1 September 1967; trawl; FSBC I 21763. — 2♂, 3♀ ; 6 October 1967; dredge; FSBC I 21764. — 1♂; 3 November 1967; dredge; FSBC I 21765. — HOURGLASS STATION K: 3♂, 3♀ ; 6 December 1966; dredge; FSBC I 21766. — HOURGLASS STATION L: 1♂; 13 November 1965; trawl; FSBC I 21767. — 10♂, 12♀ ; 5 September 1966; dredge; FSBC I 21768. — 6♂, 8♀ ; 13 October 1966; dredge; FSBC I 21769. — 3♂, 4♀ ; 13 November 1966; dredge; FSBC I 21770. — 1♀ ; 13 November 1966; trawl; FSBC I 21771. — 1♂, 5♀ ; 7 December 1966; dredge; FSBC I 21772. — 2♂, 1♀ ; 7 December 1966; trawl; FSBC I 21773. — 1♀ ; 13 January 1967; dredge; FSBC I 21774. — 2♂, 7♀ ; 13 January 1967; trawl; FSBC I 21775. —

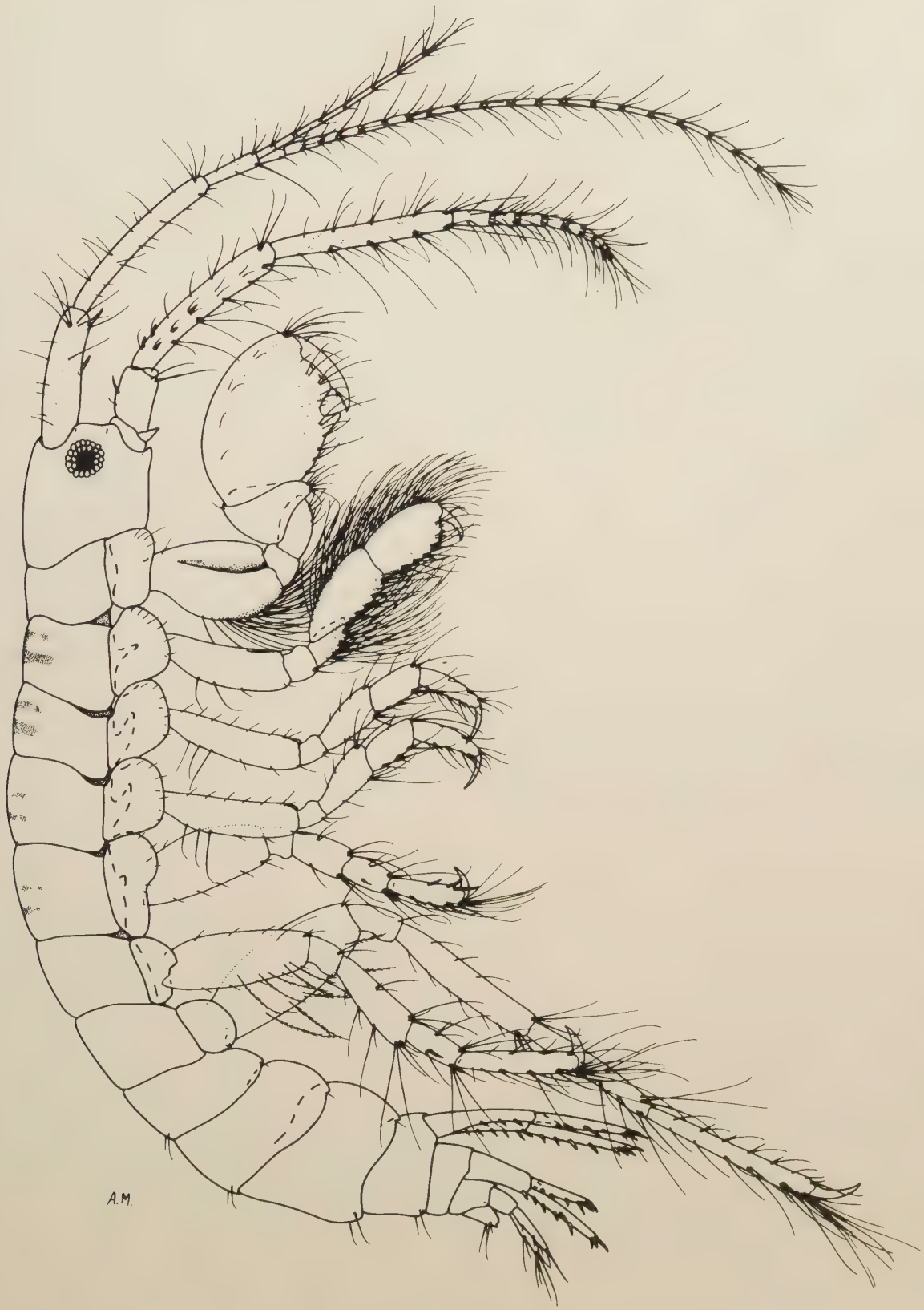

Figure 3. *Lembos tigrinus* Myers. ♂; 270° from Egmont Channel seabuoy, Florida; NMC 14139.

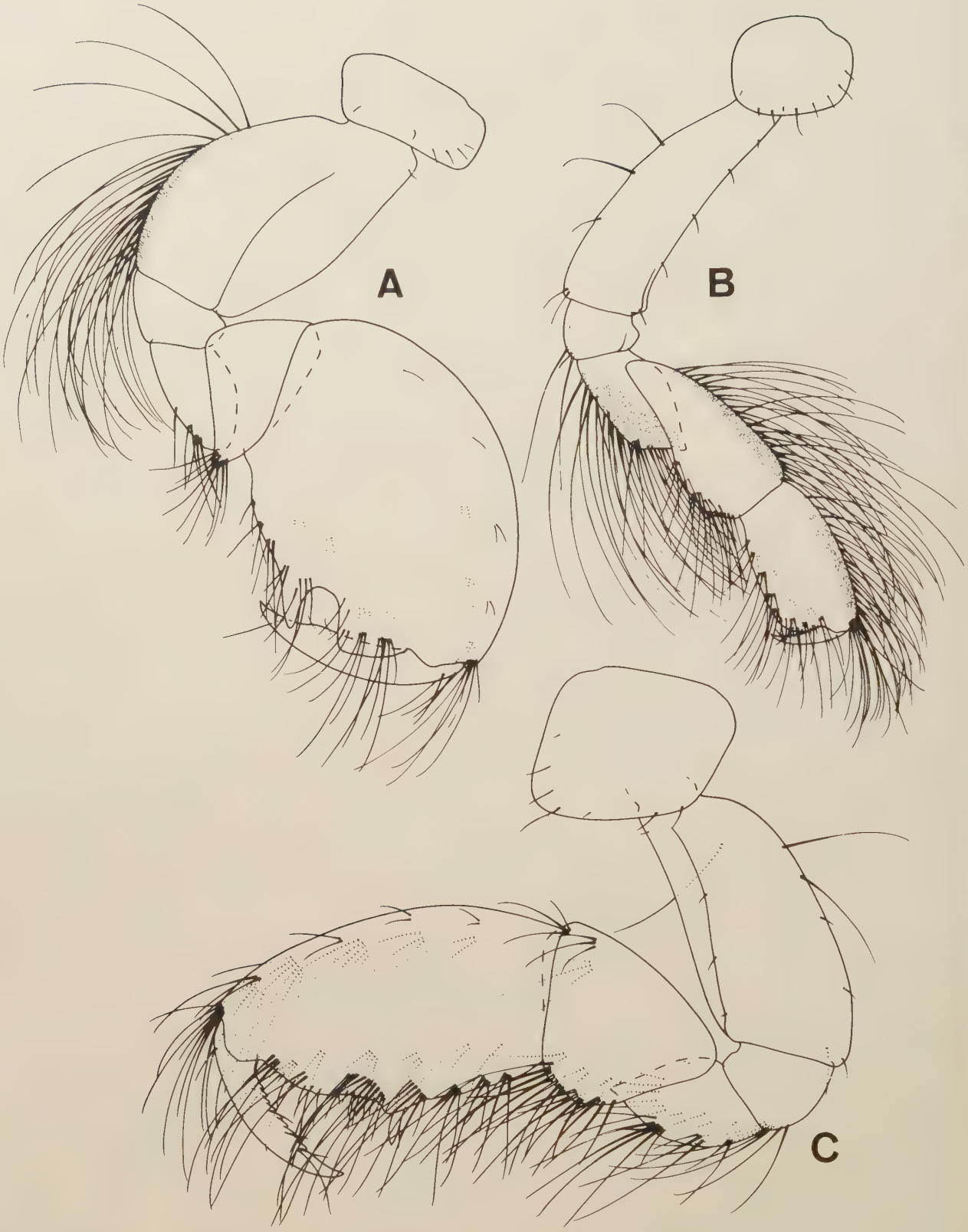

Figure 4. *Lembos tigrinus* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; ♀: C. Gnathopod 1; 270° from Egmont Channel seabuoy, Florida; NMC 14139.

1♂, 6♀; 16 February 1967; dredge; FSBC I 21776. — 7♂, 10♀; 9 March 1967; trawl; FSBC I 21777. — 2♂, 7♀; 16 May 1967; trawl; FSBC I 21778. — 1♂; 6 July 1967; dredge; FSBC I 21779. — 33♂, 46♀; 6 July 1967; trawl; FSBC I 21780. — 68♂, 111♀; 8 August 1967; dredge; (♂HOLOTYPE, USNM 172508; 10 PARATYPES, USNM 172509; 1♂, 1♀ PARATYPES, MV; 158 PARATYPES, FSBC I 21781; 8 PARATYPES, AAM 197911). — 38♂, 61♀; 8 August 1967; trawl; FSBC I 21782. — 6♂, 12♀; 5 September 1967; dredge; FSBC I 21783. — 19♂, 22♀; 5 September 1967; trawl; FSBC I 21784. — 12♂, 12♀; 12 October 1967; dredge; FSBC I 21785. — 8♂, 10♀; 12 October 1967; trawl; FSBC I 21786. — 14♂, 38♀; 15 November 1967; dredge; FSBC I 21787. — 13♂, 27♀; 15 November 1967; trawl; FSBC I 21788. — HOURGLASS STATION M: 2♂, 2♀; 14 January 1966; dredge; FSBC I 21789. — 1♂, 2♀; 15 February 1966; trawl; FSBC I 21790. — 1♂, 3♀; 6 July 1966; dredge; FSBC I 21791. — 1♀; 6 August 1966; dredge; FSBC I 21792. — 11♂, 22♀; 5 September 1966; dredge; FSBC I 21793. — 1♂, 4♀; 13 October 1966; dredge; FSBC I 21794. — 2♂; 13 October 1966; trawl; FSBC I 21795. — 6♂, 12♀; 13 November 1966; dredge; FSBC I 21796. — 1♂, 1♀; 13 November 1966; trawl; FSBC I 21797. — 2♀; 7 December 1966; dredge; FSBC I 21798. — 5♂, 7♀; 13 January 1967; dredge; FSBC I 21799. — 7♂, 20♀; 13 January 1967; trawl; FSBC I 22033. — 12♂, 27♀; 16 February 1967; trawl; FSBC I 21800. — 12♂, 23♀; 9 March 1967; dredge; FSBC I 21801. — 2♂, 5♀; 8 April 1967; dredge; FSBC I 21802. — 1♂, 3♀; 7 June 1967; dredge; FSBC I 21803. — 2♂, 3♀; 7 June 1967; trawl; FSBC I 21804. — 6♂, 10♀; 6 July 1967; dredge; FSBC I 21805. — 36♂, 59♀; 6 July 1967; trawl; FSBC I 21806. — 11♂, 17♀; 8 August 1967; dredge; FSBC I 21807. — 20♂, 30♀; 8 August 1967; trawl; FSBC I 21808. — 1♂, 2♀; 5 September 1967; dredge; FSBC I 21809. — 1♂, 4♀; 5 September 1967; trawl; FSBC I 21810. — 7♂, 7♀; 12 October 1967; dredge; FSBC I 21811. — 14♂, 18♀; 12 October 1967; trawl; FSBC I 21812. — 4♂, 7♀; 15 November 1967; dredge; FSBC I 21813. — OTHER MATERIAL: 10♂, 12♀; 15 October 1976; 270° from Egmont Channel seabuoy, Florida, 27°37.5′N, 83°59.3′W; 54.8 m; D. K. Camp; NMC 14139. — 5♂, 12♀; 15 October 1976; 270° from Egmont Channel seabuoy, Florida, 27°37.6′N, 84°13.5′W; 67.6 m; D. K. Camp; NMC 14140. — 4♂, 1♀; 15 October 1976; 65 nmi west of Egmont Key, Florida, 27°37′N, 83°58′W; 53.9 m; E. L. Bousfield; NMC 14141. — 4♂, 1♀; 15 October 1976; 78 nmi west of Egmont Key, Florida, 27°37.3′N, 84°14.1′W; 73.1 m; E.L. Bousfield; NMC 14142. — 3♂ 2♀; 28 March 1978; approximately 73 nmi due west of Sanibel Island Light, Florida, 26°24′N, 83°22′W; 55m; dredge; E.L. Bousfield; NMC 14143. — 1♂, 2♀; 28 March 1978; approximately 92 nmi due west of Sanibel Island Light, Florida, 26°24′N, 83°42′W; 73 m; dredge; mostly coarse sand; E.L. Bousfield; NMC 14144.

Diagnosis: Male length 5.0 mm. Pereon segments 2-5 each with two bands of reddish-brown pigment (in alcohol); bands confluent dorsally, extending less than halfway down lateral surfaces of terga; anterior band frequently disrupted into series of spots; posterior band generally continuous. Pereon segments 2-5 bearing sternal processes. Gnathopod 1 basis large, subovoid, posterior distal margin with "brush" of very long setae; carpus very short, cup-shaped, posterior margin produced into short process; propodus massive, three times length of carpus, anterior margin strongly convex, posterior margin sinuous; short, transverse palm separated from stout, posterodistal tooth by deep, round-bottomed incision; dactylus swollen medially, greatly overlapping palm. Gnathopod 2 basis anterior margin weakly concave; carpus slightly longer than propodus; dactylus slightly overlapping palm; posterior margin of merus with "brush" of very long setae; anterior margins of carpus and propodus densely clothed in long setae. Pereopods 5-7 length ratios 2:3:4.

Female length 6.0 mm. Gnathopod 1 propodus almost twice length of carpus; palm very oblique, almost equal to length of posterior margin, separated from margin by short, rounded protuberance. Gnathopod 2 propodus distinctly longer than carpus, slender, parallel-sided; palm oblique; dactylus fitting palm.

Type-locality: Hourglass Station L, 26°24′N, 83°22′W; 55 m; about 73 nmi off Sanibel Island Light, Florida west coast.

Distribution: Central West Florida Shelf; 18-73 m.

Remarks: The characters of this species are rather constant; even very young males are readily identifiable by the setal "brush" on the posterodistal margin of the gnathopod 1 basis. In this character, *L. tigrinus* is unique among currently known West Atlantic species, although the character is known from several East Atlantic-Mediterranean species. *Lembos tigrinus* is superficially similar to *L. tempus*, which also has long setae on the basis of gnathopod 1 in the male. In that species, however, the setae never form a dense "brush" but occur in pairs or as singletons. *Lembos tigrinus* also differs from *L. tempus* in structure of the male gnathopod 2 and pereopods 3 and 4 (for which see *Diagnosis* and *Remarks* of that species). In recently preserved material, *L. tigrinus* is recognisable by its characteristic colour pattern, although a very similar pattern occurs in *L. dentischium*, a species not collected by the Hourglass Cruises but known from the Florida Keys and the Bahamas. *Lembos tigrinus* is easily separable from *L. dentischium* by its highly setose gnathopod 2 in the male. Females of *L. tigrinus* have no obvious diagnostic morphological characteristics, though allocation of females to their respective males is possible in mixed samples by reference to subtle differences in the configuration of gnathopod 1. The colour pattern is consistent in both sexes and can be of considerable value in identification of females.

Lembos tempus Myers, 1979

Figures 5, 6; Plate I

Lembos tempus Myers, 1979a, pp. 227-232, figs. 175-177.

Material examined: HOURGLASS STATION C: 1♀; 27 March 1966; trawl; FSBC I 21632. — 1♀; 14 March 1967; trawl; FSBC I 21633. — 1♀; 11 May 1967; dredge; FSBC I 21634. — 1♀; 1 September 1967; trawl; FSBC I 21635. — 1♀; 5 October 1967; dredge; FSBC I 21636. — 1♀; 2 November 1967; trawl; FSBC I 21637. — 1♀; 21 November 1967; trawl; FSBC I 21638. — HOURGLASS STATION D: 1♀; 21 October 1965; trawl; FSBC I 21639. — 1♀; 4 December 1965; dredge; FSBC I 21640. — 1♂; 21 February 1966; dredge; FSBC I 21641. — 1♂; 4 March 1966; trawl; FSBC I 21642. — 2♂, 2♀; 27 March 1966; dredge; FSBC I 21643. — 10♂, 23♀; 19 May 1966; trawl; (♂HOLOTYPE, USNM 172510; 10 PARATYPES, USNM 172511; 1♂, 1♀ PARATYPES, MV; 12 PARATYPES, FSBC I 21644; 8 PARATYPES, AAM 197912). — 1♂, 1♀; 11 July 1966; dredge; FSBC I 21645. — 1♀; 11 August 1966; dredge; FSBC I 21646. — 2♀; 19 October 1966; trawl; FSBC I 21647. — 1♂; 9 November 1966; dredge; FSBC I 21648. — 1♂; 26 January 1967; trawl; FSBC I 21649. — 1♂, 2♀; 6 February 1967; dredge; FSBC I 21650. — 2♀; 6 February 1967; trawl; FSBC I 21651. — 6♂, 5♀; 28 February 1967; dredge; FSBC I 21652. — 1♀; 28 February 1967; trawl; FSBC I 21653. — 3♀; 3 March 1967; dredge; FSBC I 21654. — 1♂; 3 March 1967; trawl; FSBC I 21655. — 3♂, 2♀; 15 March 1967; dredge; FSBC I 21656. — 1♂; 15 March 1967; trawl; FSBC I 21657. — 7♂, 14♀; 4 April 1967; dredge; FSBC I 21658. — 1♂; 12 April 1967; trawl; FSBC I 21659. — 1♀; 12 May 1967; dredge; FSBC I 21660. — 1♂, 1♀; 12 May 1967; trawl; FSBC I 21661. — 1♂, 1♀; 21 May 1967; dredge; FSBC I 21662. — 1♂, 1♀; 3 June 1967; dredge; FSBC I 21663. — 3♂, 3♀; 21 June 1967; dredge; FSBC I 21664. — 1♂; 21 June 1967; trawl; FSBC I 21665. — 3♂, 1♀; 12 July 1967; dredge; FSBC I 21666. — 1♀; 2 August 1967; trawl; FSBC I 21667. — 2♂, 2♀; 25 August 1967; trawl; FSBC I 21668. — 9♂, 9♀; 1 September 1967; trawl; FSBC I 21669. — 1♂, 1♀; 12 September 1967; dredge; FSBC I 21670. — 1♀; 12 September 1967; trawl; FSBC I 21671. — 1♂, 4♀; 6 October 1967; dredge; FSBC I 21672. — 8♂, 9♀; 6 October 1967; trawl; FSBC I 21673. — 1♀; 27 October 1967; dredge; FSBC I 21674. — 1♂, 3♀; 27 October 1967; trawl; FSBC I 21675. — 3♂; 21 November 1967; dredge; FSBC I 21676. — 3♂, 5♀; 21 November 1967; trawl; FSBC I 21677. — HOURGLASS STATION E: 2♂, 2♀; 4 January 1966; dredge; FSBC I 21678. — 1♂; 12 May 1967; dredge; FSBC I 21679. — 5♂, 6♀; 2 August 1967; dredge; FSBC I 21680. — 1♂; 2 August 1967; trawl; FSBC I 21681. — HOURGLASS STATION K: 1 ; 6 December 1966; dredge;

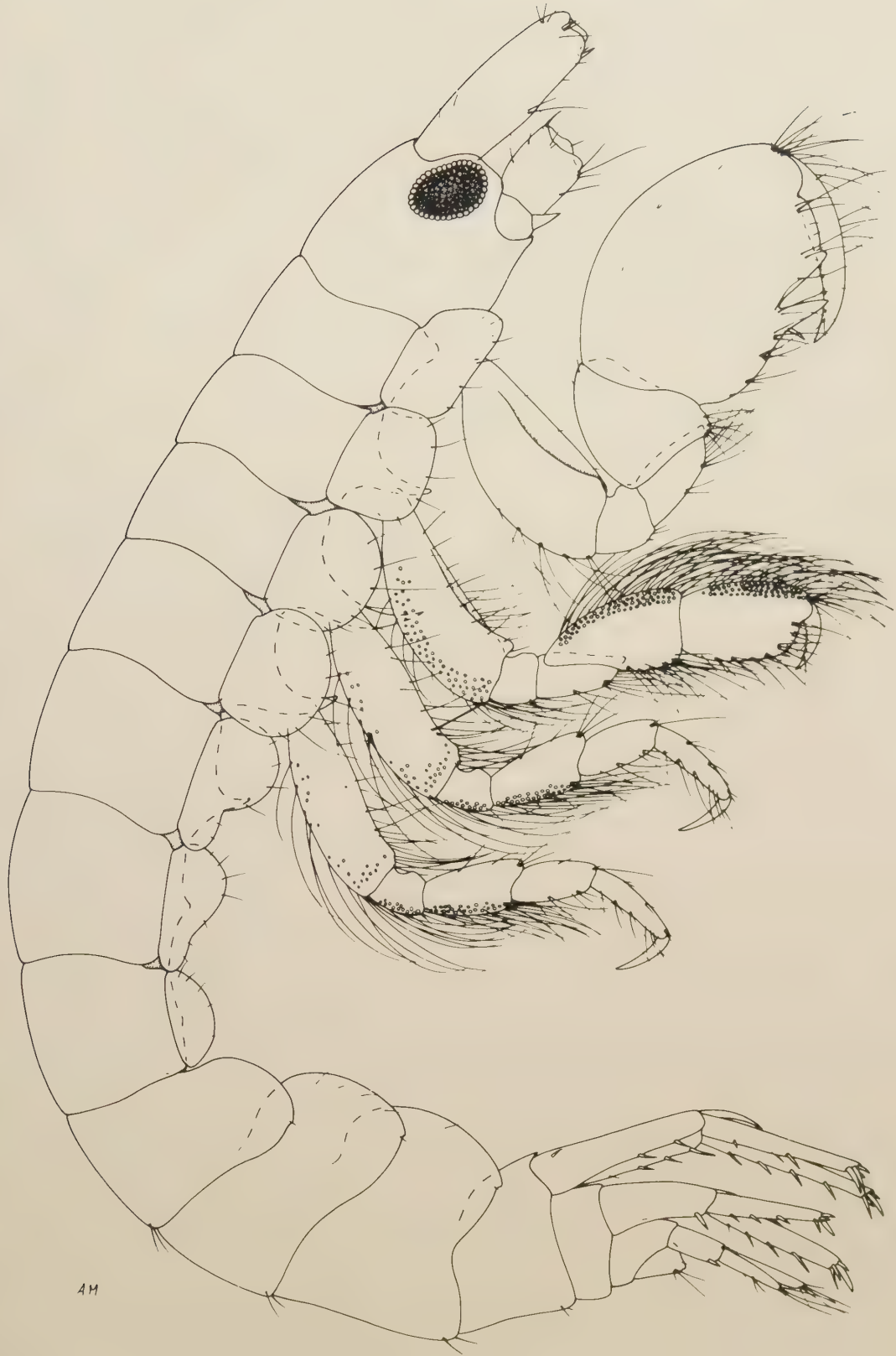

Figure 5. *Lembos tempus* Myers. ♂PARATYPE; Hourglass Station D; FSBC I 21644.

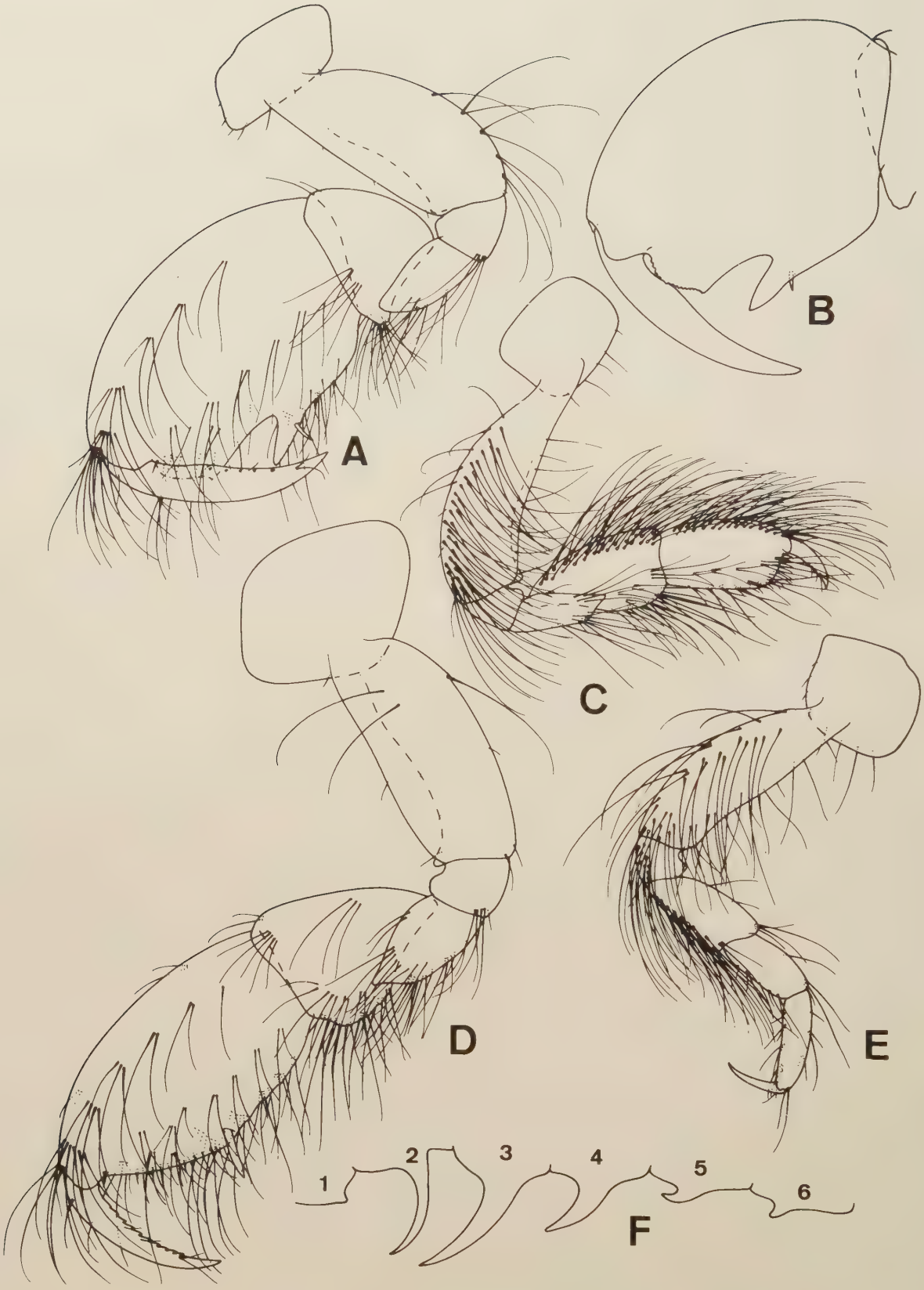

Figure 6. *Lembos tempus* Myers. ♂ PARATYPES: A. Gnathopod 1; B. Gnathopod 1, another specimen; C. Gnathopod 2; E. Pereopod 3; F. Sternal processes; ♀PARATYPE: D. Gnathopod 1; Hourglass Station D; FSBC I 21644.

FSBC I 21682. — 1♀; 6 June 1967; dredge; FSBC I 21683. — 8♂, 1♀; 4 September 1967; dredge; FSBC I 21684. — 1♀; 4 September 1967; trawl; FSBC I 21685. — 3♂, 4♀; 14 November 1967; dredge; FSBC I 21686. — HOURGLASS STATION L: 1♀; 6 July 1966; dredge; FSBC I 21687. — 1♂, 1♀; 6 August 1966; dredge; FSBC I 21688. — 1♀; 6 August 1966; trawl; FSBC I 21689. — 3♂, 5♀; 5 September 1966; dredge; FSBC I 21690. — 1♂, 1♀; 13 October 1966; dredge; FSBC I 21691. — 1♂, 1♀; 16 February 1967; dredge; FSBC I 21692. — 2♀, 1 immature; 16 February 1967; trawl; FSBC I 21693. — 3♂; 9 March 1967; trawl; FSBC I 21694. — 1♂, 5♀; 7 June 1967; dredge; FSBC I 21695. — 1♂, 2♀; 7 June 1967; trawl; FSBC I 21696. — 2♂, 3♀; 6 July 1967; dredge; FSBC I 21697. — 5♂, 9♀; 6 July 1967; trawl; FSBC I 21698. — 19♂, 31♀; 8 August 1967; dredge; FSBC I 21699. — 8♂, 5♀; 8 August 1967; trawl; FSBC I 21700. — 2♂, 1♀; 5 September 1967; dredge; FSBC I 21701. — 1♀, 5 September 1967; trawl; FSBC I 21702. — 2♀, 2 immature; 12 October 1967; dredge; FSBC I 21703. — 3♂, 2♀; 12 October 1967; trawl; FSBC I 21704. — 2♀; 15 November 1967; trawl; FSBC I 21705. — HOURGLASS STATION M: 3♂, 1♀; 5 September 1966; dredge; FSBC I 21706. — 3♂; 3♀; 13 January 1967; dredge; FSBC I 21707. — 1♂, 2♀; 16 May 1967; trawl; FSBC I 21708. — 2♂, 1♀; 6 July 1967; trawl; FSBC I 21709. — 3♂; 8 August 1967; trawl; FSBC I 21710. — HOURGLASS STATION N: 1♀; 6-7 July 1967; crevalle jack baited trap; FSBC I 21711. — OTHER MATERIAL: 1♂, 1♀; 15 October 1976; 270° from Egmont Channel seabuoy, Florida, 27°37.5′N, 83°59.3′W; 54.8 m; D. K. Camp; NMC 14145. — 1♂, 3♀; 28 March 1978; approximately 73 nmi due west of Sanibel Island Light, Florida, 26°24′N, 83°22′W; 55 m; dredge; E.L. Bousfield; NMC 14146. — 3♂, 5♀; 28 March 1978; approximately 92 nmi due west of Sanibel Island Light, Florida, 26°24′N, 83°42′W; 73 m; dredge; mostly coarse sand; E.L. Bousfield; NMC 14147. — 4♂, 5♀; 29 March 1978; approximately 51 nmi due west of Sanibel Island Light, Florida, 26°23.5′N, 82°59.5′W; 39 m; dredge; shell sand; E.L. Bousfield; NMC 14148. — 2♂; same; NMC 14149.

Diagnosis: Male length 6.0 mm. Body uniform pale brown (in alcohol). Eye rather large, composed of large number of very small ommatidea. Pereon segments 2-6 (± 7) bearing sternal processes. Gnathopod 1 basis enlarged, anterior margin almost straight, posterodistal margin with few pairs of (or solitary) long setae; carpus short, cup-shaped; propodus massive, three times length of carpus; palm short, convex, crenulate in hyperadults, separated from stout posterodistal tooth by deep, triangular incision, posterior margin straight but deeply indented proximally; dactylus swollen medially, greatly overlapping palm. Gnathopod 2 basis anterior margin weakly concave, with few long setae, posterior margin densely clothed in very long setae; carpus and propodus subequal in length, both with very long setae on anterior margin; dactylus fitting palm. Pereopods 3 and 4 similar; basis anterior margin with few long setae, posterior and distal margins with numerous long setae; ischium and merus posterior margins densely clothed in long setae. Pereopods 5-7 unknown.

Female length 6.5 mm. Gnathopod 1 propodus almost twice length of carpus; palm very oblique. Gnathopod 2 propodus distinctly longer than carpus, slender, parallel-sided; palm oblique; dactylus fitting palm.

Type-locality: Hourglass Station D, 27°37′N, 83°58′W; 55 m; about 65 nmi off Egmont Key, Florida west coast.

Distribution: Central West Florida Shelf; 37-73 m.

Remarks: This species differs from all other known West Atlantic species of *Lembos* by the strongly setose male pereopods 3 and 4. In this character it resembles the "*megacheir*" group of species (see Myers, 1976) but differs from all the species of that group by having numerous long setae on the basis and ischium in addition to those on the merus. In damaged male specimens lacking pereopods 3 and 4, the strongly setose basis of gnathopod 2 is diagnostic, even in quite small specimens. In mixed samples

of *L. tempus* and *L. tigrinus*, females may be distinguished by the larger eye and absence of any rounded protuberance on the gnathopod 1 palm. Females of this species can be separated from those of *L. spinicarpus* by the more parallel-sided propodus of gnathopod 1.

Lembos spinicarpus spinicarpus (Pearse, 1912)

Figure 7

Lembopsis spinicarpus Pearse, 1912, pp. 372-373, fig. 4.

Lembos spinicarpus: Myers, 1979a, pp. 232-237, figs. 178-180.

Diagnosis: Male length 6.0 mm. Pereon segments 2-5 with dark brown, stellate pigment spots (in alcohol); pleon segments, 1-3 with similar but more diffuse markings. Pereon segments 4-5 with well-developed sternal processes; segments 3 and 6 with reduced processes. Gnathopod 1 basis large, anterior margin weakly convex; carpus with posterior margin produced into strong tooth; propodus one and one-half times length of carpus, posterior margin straight, terminating in stout triangular tooth, separated by deep, round-bottomed depression from short, almost transverse palm; dactylus stout, posterior margin strongly toothed. Gnathopod 2 basis with weak anterodistal tooth; carpus elongate; propodus short, broader distally, anterior margin strongly convex; anterior and posterior margins of carpus and propodus strongly setiferous.

Female length 7.0 mm. Gnathopod 1 propodus scarcely longer than carpus, markedly narrower proximally; palm oblique. Gnathopod 2 propodus scarcely longer than carpus; palm oblique; dactylus fitting palm.

Type-locality: Key West, Florida.

Distribution: Tropical Florida and the Bahamas; 1-4 m.

Remarks: Adult males of the nominate subspecies are immediately recognisable, differing from all other known Florida shelf species by the toothed carpus of gnathopod 1.

Lembos spinicarpus inermis Myers, 1979

Figures 8, 9

Lembos spinicarpus inermis Myers, 1979a, pp. 237-239, fig. 181.

Material examined: HOURGLASS STATION B: 1♀; 7 February 1966; dredge; FSBC I 21499. — 1♀; 27 February 1967; trawl; FSBC I 21500. — 1♀; 2 March 1967; dredge; FSBC I 21501. — 3♀; 11 May 1967; trawl; FSBC I 21502. — 2♀; 1 August 1967; dredge; FSBC I 21503. — 1♀; 1 August 1967; trawl; FSBC I 21504. — 1♀; 11 September 1967; trawl; FSBC I 21505. — 1♀; 2 November 1967; dredge; FSBC I 21506. — HOURGLASS STATION C: 1♀; 1 December 1966; dredge; FSBC I 21507. — 1♀; 6 January 1967; dredge; FSBC I 21508. — 1♂, 1♀; 5 February 1967; dredge; FSBC I 21509. — 3♀; 2 March 1967; dredge; FSBC I 21510. — 1♀; 20 May 1967; dredge; FSBC I 21511. — 2♂, 8♀; 20 May 1967; trawl; FSBC I 21512. — 2♂, 4♀; 2 June 1967; dredge; FSBC I 21513. — 1♀; 2 June 1967; trawl; FSBC I 21514. — 1♀; 1 July 1967; dredge; FSBC I 21515. — 2♀; 11 July 1967; dredge; FSBC I 21516. — 1♀; 1 September 1967; trawl; FSBC I 21517. — 1♀; 25 October 1967; trawl; FSBC I 21518. — 1♀; 21 November 1967; dredge; FSBC I 21519. — 1♂; 21 November 1967; trawl; FSBC I 21520. —

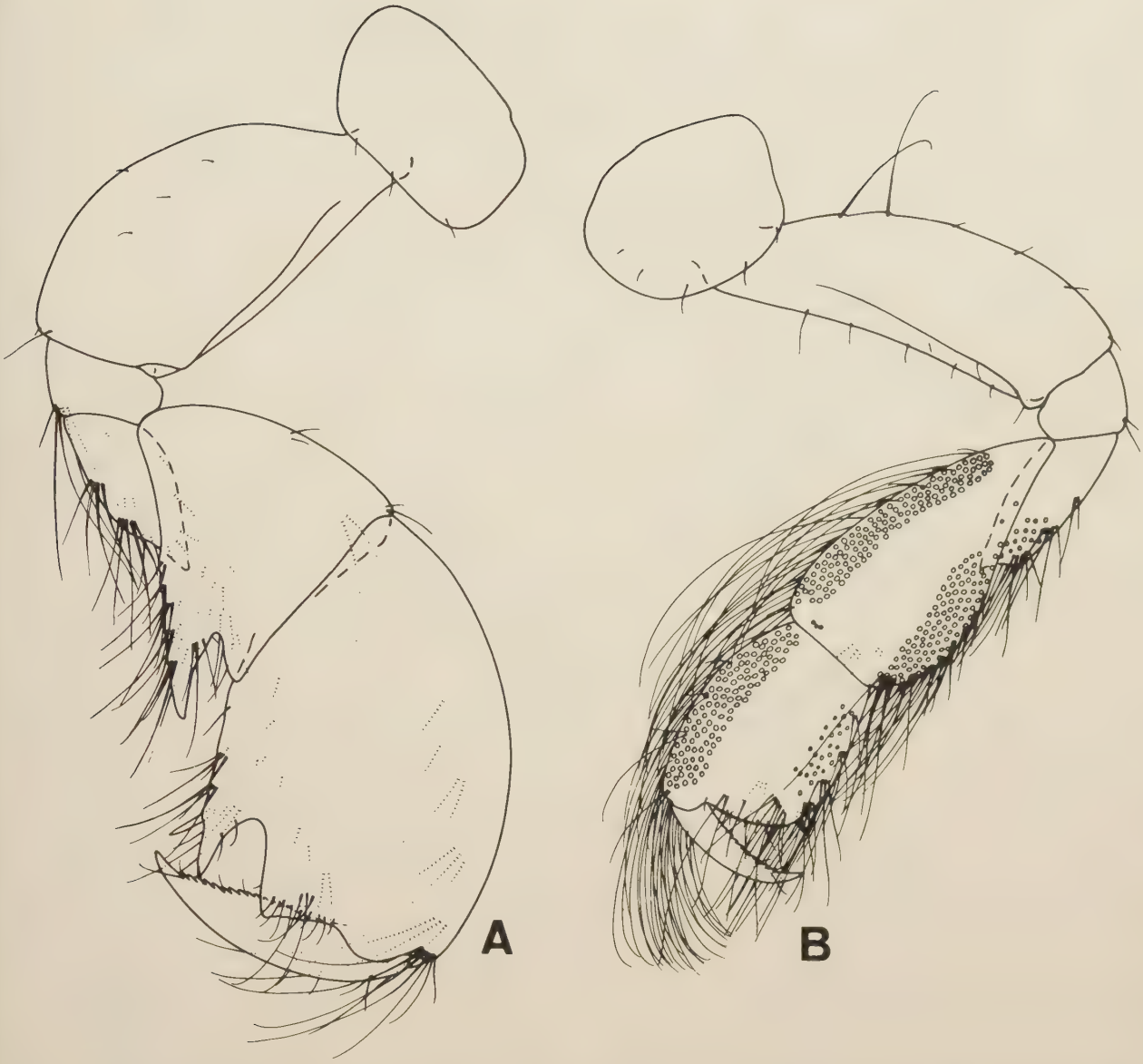

Figure 7. *Lembos spinicarpus spinicarpus* (Pearse). ♂: A. Gnathopod 1; B. Gnathopod 2; Key West, Florida; AAM 19733.

HOURGLASS STATION D: 2♀; 1 September 1967; dredge; FSBC I 21521. — 1♀; 6 October 1967; trawl; FSBC I 21522. — HOURGLASS STATION E: 5♂, 4♀; 9 November 1966; trawl; FSBC I 21523. — 1♀, 2 immature; 2 December 1966; dredge; FSBC I 21524. — 1♀; 6 October 1967; dredge; FSBC I 21525. — HOURGLASS STATION I: 1♀; 6 August 1965; trawl; FSBC I 21526. — 1♀; 15 May 1967; dredge; FSBC I 21527. — HOURGLASS STATION J: 1♀; 12 November 1966; trawl; FSBC I 21528. — 1♀; 6 August 1967; scuba; FSBC I 21529. — HOURGLASS STATION K: 1♂, 1♀; 6 December 1966; dredge; FSBC I 21530. — 1♀; 15 May 1967; dredge; FSBC I 21531. — 1♀; 6 June 1967; trawl; FSBC I 21532. — 1♂, 1♀; 5 July 1967; dredge; FSBC I 21533. — 1♂; 4 September 1967; dredge; FSBC I 21534. — 2♂, 1♀; 14 November 1967; dredge; FSBC I 21535. — HOURGLASS STATION L: 2♂, 1♀; 5 September 1966; dredge; FSBC I 21536. — 2♀; 13 October 1966; dredge; FSBC I 21537. — 2♀; 9 March 1967; trawl; FSBC I 21538. — 1♂; 7 June 1967; dredge; FSBC I 21539. — 1♂, 3♀; 8 August 1967; dredge; FSBC I 21540. — 1♂, 1♀; 8 August 1967; trawl; FSBC I 21541. — 2♂, 7♀; 5 September 1967; dredge; (♂ HOLOTYPE, USNM 172512; ♀ ALLOTYPE, USNM 172513; 2 PARATYPES, MV; 5 PARATYPES, FSBC I 21542). — 1♂; 12 October 1967; dredge; FSBC I

Figure 8. *Lembos spinicarpus inermis* Myers. ♂; Hourglass Station C; FSBC I 21512.

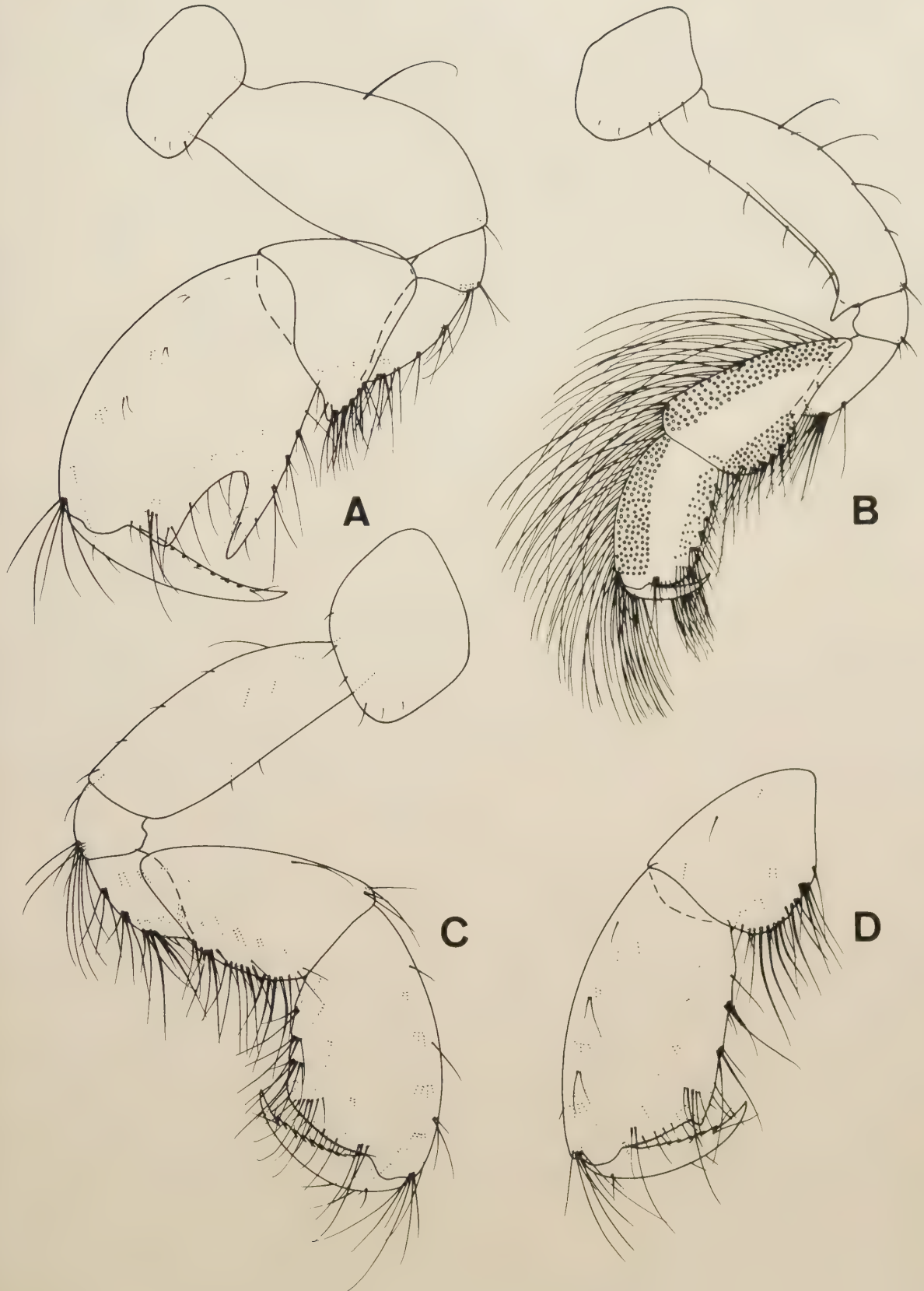

Figure 9. *Lembos spinicarpus inermis* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; D. Gnathopod 1, juvenile; ♀: C. Gnathopod 1; Hourglass Station C; FSBC I 21512.

21543. — 5♀, 9 immature; 15 November 1967; dredge; FSBC I 21544. — 4♀; 15 November 1967; trawl; FSBC I 21545. — HOURGLASS STATION M: 1♂, 11♀; 5 September 1966; dredge; FSBC I 21546. — 1♀; 7 December 1966; dredge; FSBC I 21547. — OTHER MATERIAL: 2♀; 14 October 1976; 38 nmi west of Egmont Key, Florida, 27°36.2′N, 83°31.0′W; 39 m; dredge; E.L. Bousfield; NMC 14150. — 2♂; 15 October 1976; 65 nmi west of Egmont Key, Florida, 27°37.5′N, 83°59.3′W; 55 m; dredge; E.L. Bousfield; NMC 14151.

Diagnosis: Male length 6.0 mm. Pigmentation as in nominate subspecies. Pereon segments 3-5 with well-developed sternal processes; segments 2 and 6 with reduced processes. Gnathopod 1 basis large, anterior margin weakly convex; carpus with posterior margin produced into small, triangular tooth; propodus twice length of carpus, with long, slender posteroproximal tooth resulting from very deep palmar excavation; palm remnant very short; dactylus slender, posterior margin weakly toothed. Gnathopod 2 basis anterodistal margin produced into long, slender tooth; carpus subtriangular, becoming much broader distally than maximal propodal width; propodus slender, almost parallel-sided.

Female not differing from that of nominate subspecies.

Type-locality: Hourglass Station L, 26°24′N, 83°22′W; 55 m; about 73 nmi off Sanibel Island Light, Florida west coast.

Distribution: Central West Florida Shelf; 6-73 m.

Remarks: Adult males of this subspecies differ from those of the nominate subspecies by the short carpal tooth and weakly toothed dactyls of gnathopod 1 and by the triangular carpus and elongate, parallel-sided propodus of gnathopod 2. They may be distinguished from the two other Florida shelf species with superficially similar gnathopod 1 morphology (viz., *L. tempus* and *L. unifasciatus*) by the radically different gnathopod 2. Juvenile male *L. spinicarpus inermis* are more easily confused, particularly with *L. unifasciatus*; they can be distinguished, however, by their relatively larger gnathopod 1 carpus in addition to the strongly setose gnathopod 2.

Lembos unicornis Bynum and Fox, 1977

Figures 10, 11; Plate I

Microdeutopus anomalus: Kunkel, 1910, pp. 76-78, fig. 29 [not *Gammarus anomalus* Rathke, 1843, pp. 63-65, pl. 4, fig. 7].

Lembos sp. Williams and Bynum, 1972, p. 178; Fox and Bynum, 1975, p. 225.

Lembos unicornis Bynum and Fox, 1977, pp. 23-28, figs. 15, 16; Myers, 1977b, pp. 146-153, figs. 148-152.

Material examined: HOURGLASS STATION B: 1♀; 5 February 1967; dredge; FSBC I 21469. — 1♀; 27 February 1967; dredge; FSBC I 21470. — 1♀; 20 May 1967; dredge; FSBC I 21471. — 1♂; 20 June 1967; trawl; FSBC I 21472. — 1♀; 11 August 1967; dredge; FSBC I 21473. — HOURGLASS STATION I: 1♂, 1♀; 14 November 1967; dredge; FSBC I 21474. — HOURGLASS STATION J: 1♀; 14 November 1967; dredge; FSBC I 21475. — OTHER MATERIAL: 2♀; 12 October 1976; lower Tampa Bay, Florida; 4.2-7.3 m; W. G. Lyons; NMC 14152.

Diagnosis: Male length 6.0 mm. Body characteristically greenish-blue in life, with black pigment (J. D. Thomas, personal communication), turning brown in alcohol. Dorsal surface of head with reticulate markings; pereon segments 2-5, occasionally 6, rarely 7, and pleon segments 1-3 with markings of considerable individual variability, sometimes organised into complete dorsal bands,

Figure 10. *Lembos unicornis* Bynum and Fox. ♂; Conch Key, Monroe County, Florida; AAM 197340.

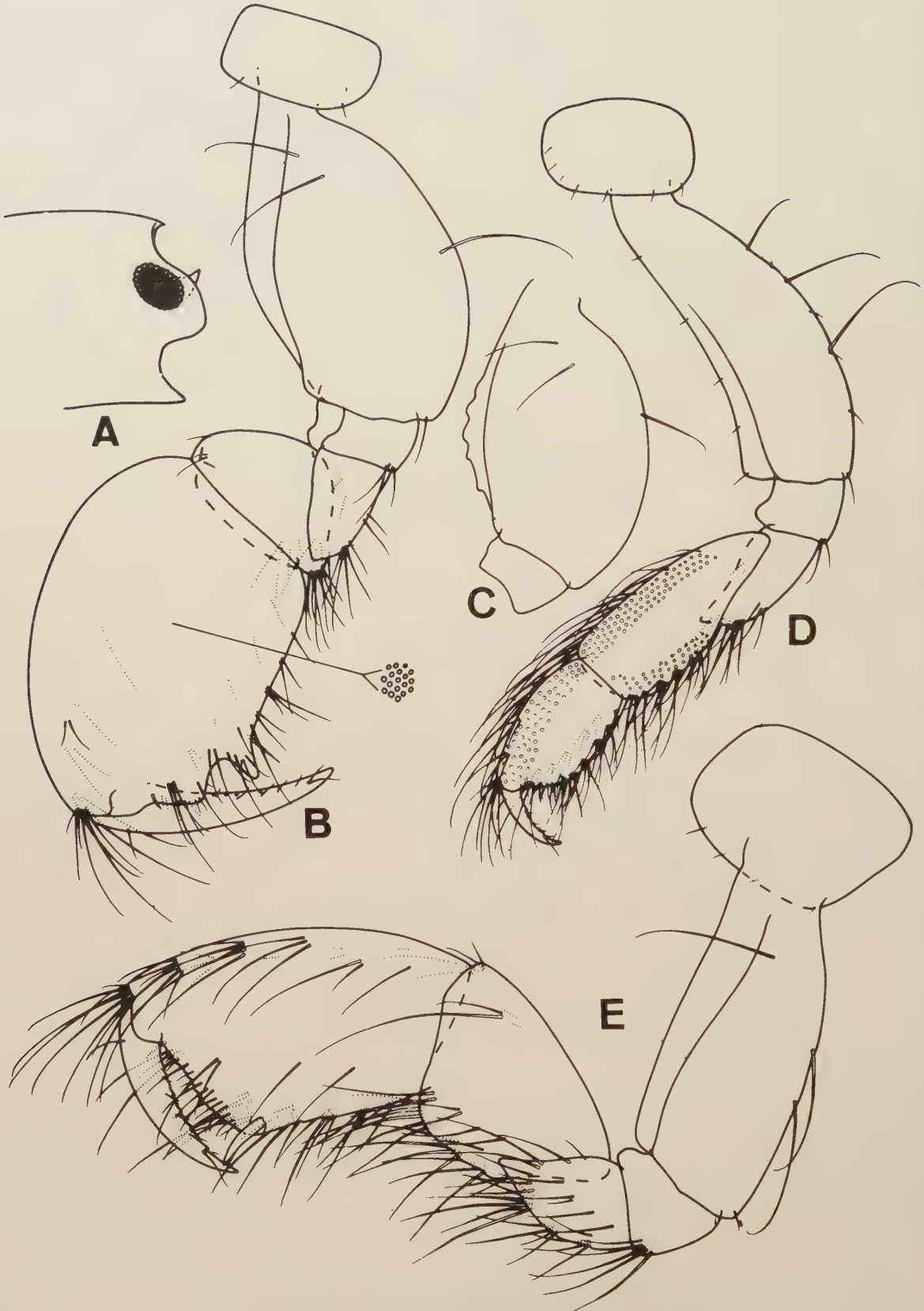

Figure 11. *Lembos unicornis* Bynum and Fox.♂: A. Head; B. Gnathopod 1; D. Gnathopod 2; ♀: E. Gnathopod 1; Conch Key, Monroe County, Florida; AAM 197340;♂: C. Gnathopod 1 basis; Seahorse Key, Levy County, Florida; AAM 197339.

sometimes broken middorsally. Dorsal bands sometimes so broad as to be continuous with those of adjacent segments. Segment 1 and usually segment 7 lacking pigment. Head with small, pointed rostrum; acute, upward curved, interantennular process below rostrum. Pereon segments 2-4 with sternal processes. Gnathopod 1 basis massive, subovoid, anterior margin sometimes crenulate; carpus very short, cup-shaped; propodus over three times length of carpus, anterior margin strongly convex, posterior margin almost straight to outwardly deflected posterodistal tooth; palm short, smooth, oblique, separated from posterodistal tooth by deep, round-bottomed depression; dactylus greatly overlapping palm; surface of podomeres adorned with numerous, rounded tubercles. Gnathopod 2 basis anterior margin concave, produced distally into stout, rounded process; carpus slender, one and one-half times length of propodus; carpus and propodus with inner faces of anterior margins densely clothed in long setae; dactylus fitting very oblique palm. Pereopods 5-7 length ratios 2:3:4.

Female length 5.5 mm. Gnathopod 1 propodus one and one-half times length of carpus; palm crenulate, concave proximally and distally in terminal females, resulting in shallow, triangular, medial tooth. Gnathopod 2 carpus and propodus subequal in length; palm oblique; dactylus fitting palm.

Type-locality: Bogue Sound, Morehead City, Cartaret County, North Carolina.

Distribution: Widespread; North Carolina, Florida, the Bahamas, and Puerto Rico; from 18 m depths to shoreward in the Hourglass study area.

Remarks: The pigmentation of this species, even after preservation for several years, is highly characteristic, as is the strong tuberculation of the male gnathopod 1.

Lembos unifasciatus unifasciatus Myers, 1977

Figure 12

Lembos unifasciatus Myers, 1977a, pp. 117-124, figs. 128-132.

Diagnosis: Male length 3.2 mm. Pereon segment 5 with dorsal band of discrete reddish-brown spots (in alcohol). Pereon segments 2-4 with sternal processes. Gnathopod 1 basis robust, subovoid; carpus extremely reduced, cup-shaped; propodus nearly six times length of carpus, subrectangular, posterior margin deeply indented proximally and produced distally into slender tooth, separated from short, convex palm by flat-bottomed depression; dactylus long, curved, greatly overlapping palm. Pereopods 5-7 length ratios 2:3:4. Uropods 1 and 2 each with stout, distoventral process slightly less than half length of peduncle.

Female length 3.0 mm. Gnathopod 1 propodus longer than carpus; palm oblique; dactylus fitting palm. Gnathopod 2 carpus slightly longer than propodus; palm oblique; dactylus fitting palm.

Type-locality: Conch Key, Monroe County, Florida.

Distribution: Tropical Florida, the Bahamas, and Puerto Rico; 1-2 m.

Remarks: Males of *L. unifasciatus unifasciatus* lack long setae on the anterior margin of gnathopod 2 carpus and can thus be separated from all known Florida shelf species except *L. rectangulatus*, *L. dentischium*, and *L. kunkelae*. Males can be separated from those of *L. rectangulatus* by the slender gnathopod 2 carpus and shorter pereopod 7 and from *L. dentischium* and *L. kunkelae* by lacking an

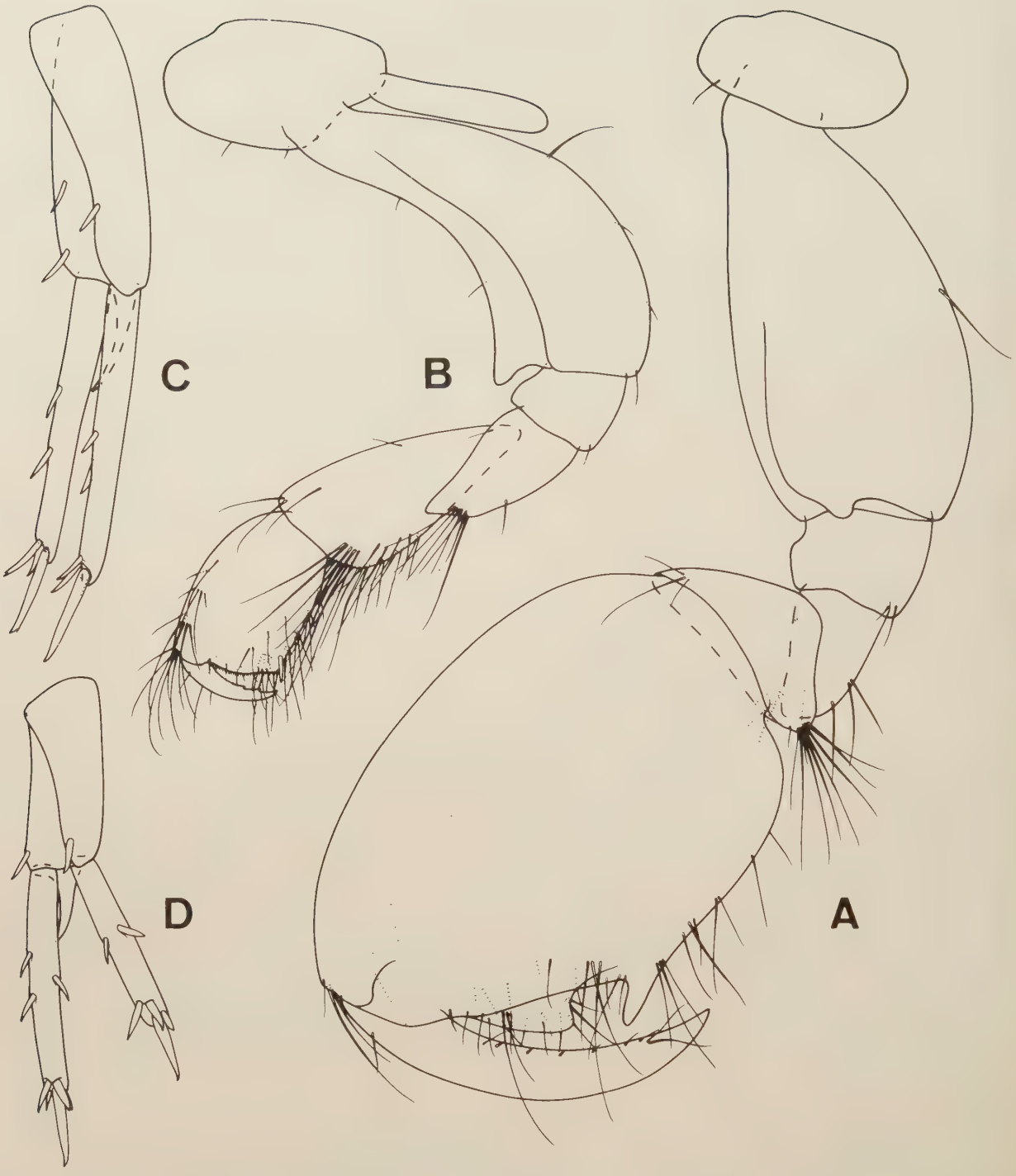

Figure 12. *Lembos unifasciatus unifasciatus* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; C. Uropod 1; D. Uropod 2; Conch Key, Monroe County, Florida; AAM 197350.

ischial tooth on gnathopod 2 (the female of *L. kunkelae* has gnathopod 1 with sinuous palm). In addition, the single band of pigment on the pereon is very distinctive in fresh material.

Lembos unifasciatus reductus Myers, 1979

Figure 13

Lembos unifasciatus reductus Myers, 1979a, pp. 244-246, fig. 185.

Material examined: HOURGLASS STATION B: 4♀; 2 November 1967; dredge; FSBC I 21465. — HOURGLASS STATION E: 1♀; 2 August 1967; dredge; FSBC I 21466. — HOURGLASS STATION J: 8♂, 20♀; 14 November 1967; dredge; (♂ HOLOTYPE, USNM 172514; ♀ ALLOTYPE, USNM 172515; 26 PARATYPES, FSBC I 21467). — HOURGLASS STATION K: 1♂, 1♀; 4 September 1967; dredge; FSBC I 21468.

Diagnosis: Male length 3.8 mm. Gnathopod 1 basis robust, anterior margin weakly convex; carpus very short, cup-shaped; propodus four times as long as carpus, posterior margin indented proximally, produced into slender tooth distally, "stepped" medially at insertion of setal bundles, posterodistal tooth separated from short palm by triangular excavation; dactylus long, greatly overlapping palm. Gnathopod 2 basis stout, anterior margin weakly concave, produced distally into strong tooth; carpus elongate, longer than propodus; dactylus slightly overlapping palm. Uropods 1 and 2 with distal, ventral processes very short, that of uropod 1 less than one-sixth length of peduncle, that of uropod 2 less than one-fifth length of peduncle.

Female not differing from that of nominate subspecies.

Type-locality: Hourglass Station J, 26°24′N, 82°28′W; 18 m; about 24 nmi off Sanibel Island Light, Florida west coast.

Distribution: Central West Florida Shelf; 18-73 m.

Remarks: *Lembos unifasciatus reductus* differs from the nominate subspecies in the very short distal ventral processes of uropods 1 and 2, in the triangular rather than flat-bottomed excavation of gnathopod 1 palm and in the weakly concave anterior margin of gnathopod 2 basis.

Lembos brunneomaculatus brunneomaculatus Myers, 1977

Figure 14

Lembos brunneomaculatus Myers, 1977a, pp. 102-111, figs. 117-123.

Diagnosis: Male length 5.0 mm. Pereon segments 1-7 and pleon segments 1-3 weakly to strongly marked with irregular brown bands; posterior dorsal portion of head with brown, reticular pattern; coxae 1 (occasionally 2), 3-4 and 6 with large, central brown blotch; pereopod 6 basis also with large, posteroproximal brown blotch. Eye subround. Pereon segments lacking sternal processes, or segment 2 with weak sternal process. Antenna 2 three-quarters length of antenna 1. Gnathopod 1 basis stout, anterior margin with numerous long setae; propodus one and one-half times length of carpus, anterior margin strongly convex, posterodistal margin produced into strong tooth separated by deep excavation from short, convex palm; carpus and propodus densely setose on inner face of anterior margin; dactylus swollen medially, overlapping palm. Gnathopod 2 basis expanded distally, anterior and posterior margins with long setae; carpus slightly longer than propodus; anterior margins of both podomeres with dense clothing of long, fine setae; dactylus fitting palm. Pereopods 5-7 length ratios 2:3:4. Pereopod 5 basis with well-developed "heel" resulting from abrupt attenuation of flange on

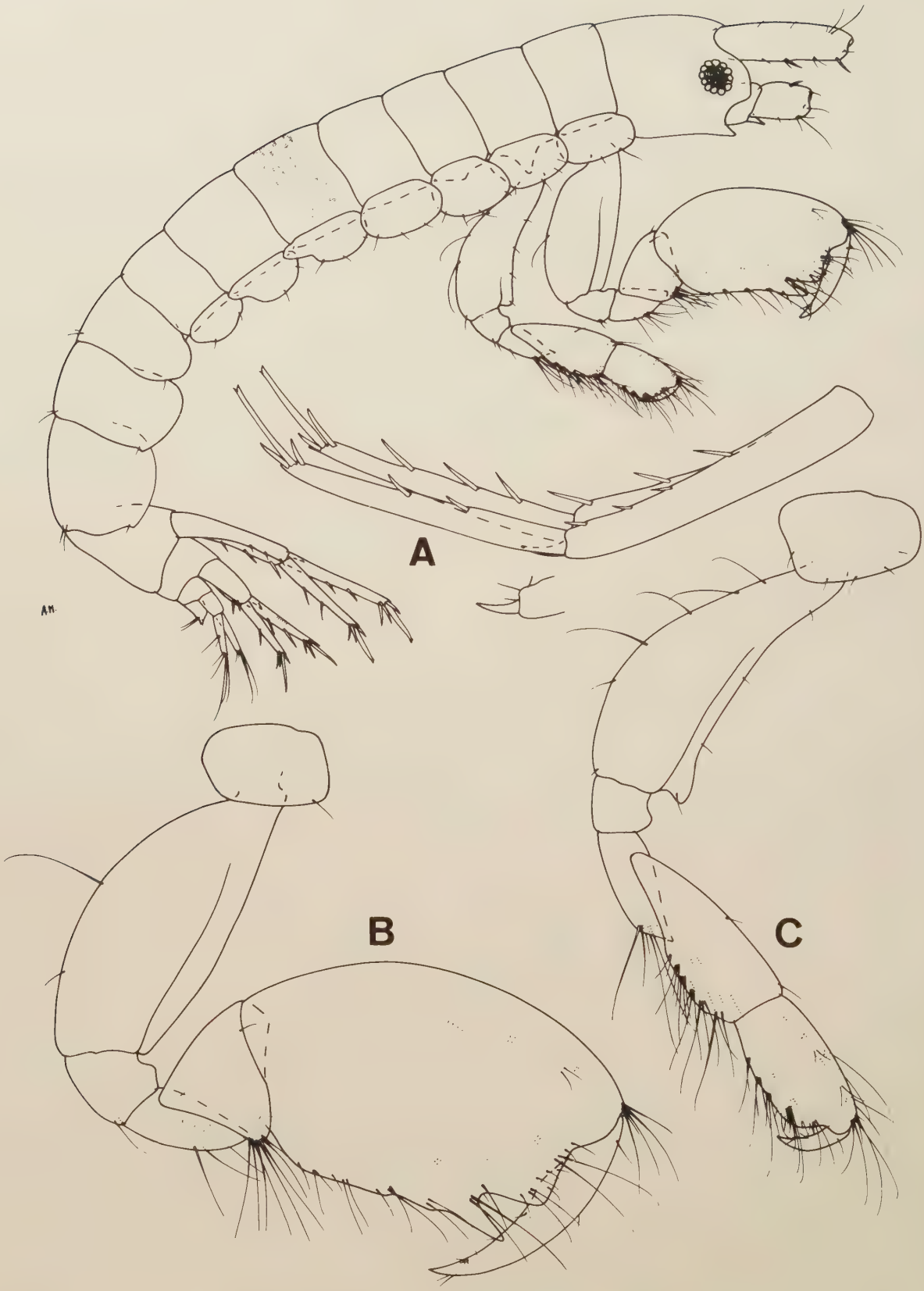

Figure 13. *Lembos unifasciatus reductus* Myers. ♂ PARATYPE: A. Uropod 1; B. Gnathopod 1; C. Gnathopod 2; Hourglass Station J; FSBC I 21467.

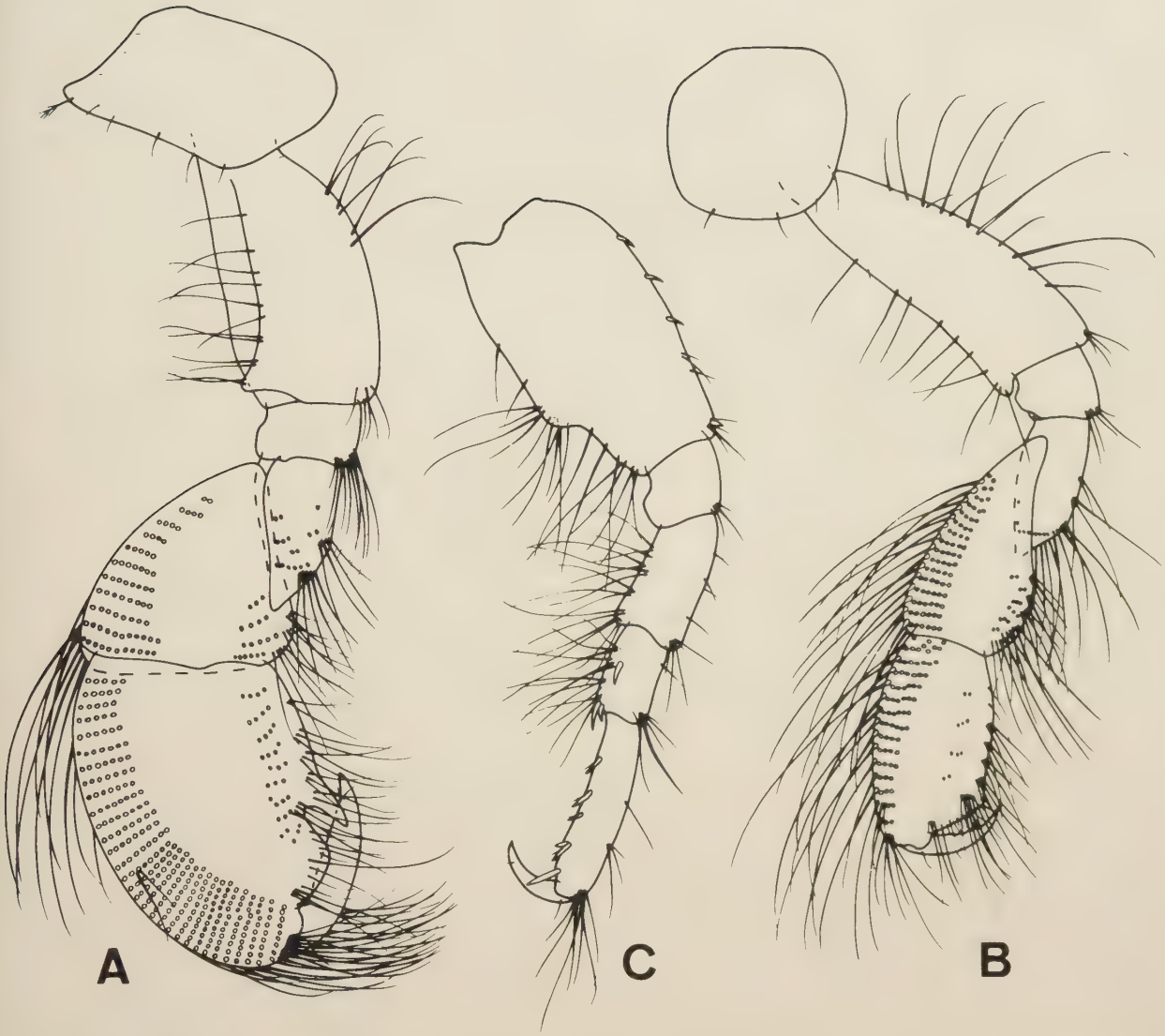

Figure 14. *Lembos brunneomaculatus brunneomaculatus* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; C. Pereopod 5; Sebastian Inlet, Brevard County, Florida; AAM 197402.

posterior margin. Pereopods 5-7 basis, merus, and carpus with very long, fine setae on posterior margin.

Female length 6.0 mm. Antenna 2 about two-thirds length of antenna 1. Gnathopod 1 carpus about two-thirds length of propodus; propodus with palm very oblique, defined by slight process and spine. Gnathopod 2 propodus slightly longer than carpus; palm oblique; dactylus fitting palm. Pereopods 5-6 merus and carpus lacking long, fine setae.

Type-locality: Sebastian Inlet, Brevard County, Florida.

Distribution: Tropical Florida; 0-2 m.

Remarks: The male of this species is characterized by the strongly setose pereopods 5-7. The only known Florida shelf species with which it could be confused are *L. minimus* and *L. setosus*, and these

differ from *L. brunneomaculatus* in lacking long setae on the anterior margins of the gnathopod 1 carpus and propodus, and in lacking a "heel" on pereopod 6 basis. Shape of male gnathopod 1, particularly the palmar region, is highly characteristic of all *L. brunneomaculatus* subspecies but is more easily conveyed by the illustrations than by description. Females have no clear diagnostic characters and cannot be identified with certainty in the absence of males. In mixed samples containing males, females can often be associated with their respective males by pigmentation patterns (except in long-preserved material). In the Hourglass samples, the only *Lembos* species occurring at the same depth as *L. brunneomaculatus* are *L. unicornis* and *L. spinicarpus*, which have radically different pigment patterns, and *L. smithi*, which has a grossly different gnathopod 1 morphology.

Lembos brunneomaculatus mackinneyi Myers, 1978

Figures 15, 16; Plate I

Lembos brunneomaculatus mackinneyi Myers, 1978, pp. 194-196, fig. 162.

Material examined: HOURGLASS STATION A: 1♀; 11 May 1967; dredge; FSBC I 21458. — 1♂; 5 October 1967; dredge; FSBC I 21459. — OTHER MATERIAL: 7♂; 7 April 1978; Dauphin Island, Alabama; Reid Garrett; NMC 14153.

Diagnosis: Male length 6.0 mm. Body irregularly mottled with reddish-brown markings (in alcohol). Eye large, subreniform. Pereon segment 2 with weak sternal process. Antennae 1 and 2 subequal in length due to elongation of peduncular articles 4 and 5 of antenna 2. Gnathopod 1 basis stout, anterior margin with numerous long setae; carpus short, with long, fine setae on posterior margin and inner face of anterodistal margin; propodus 2-3 times length of carpus; palm evenly rounded, separated from point of insertion of dactylus by deep sinus and from relatively short posterodistal tooth by round-bottomed excavation, inner face of anterior margin densely clothed in long, fine setae; dactylus stout, swollen medially, overlapping palm. Gnathopod 2 basis slender, anterior and posterior margins with long setae; carpus and propodus slender, subequal, anterior margins of both podomeres with dense clothing of long, fine setae; dactylus fitting palm. Pereopods 5-7 length ratios 2:3:5. Pereopods 5-6 merus and carpus with dense clothing of long, fine setae on posterior margin.

Female not differing from that of nominate subspecies.

Type-locality: Galveston, Texas.

Distribution: Northern Gulf of Mexico from Galveston, Texas, to near Tampa Bay, Florida (Hourglass Station A; 6 m).

Remarks: The sexually dimorphic antenna 2 is highly characteristic; it occurs also in the subspecies *longicornis* Myers, 1978, known so far only from Puerto Rico, but not in the nominate subspecies. The character is not known in any other West Atlantic species of *Lembos*. The subspecies *mackinneyi* and *longicornis* can be distinguished by the morphology of the male gnathopoda. In subspecies *longicornis*, the gnathopod 1 carpus is longer and lacks anterior marginal setae, the gnathopod 2 carpus is subtriangular, the basis and carpus lack anterior marginal setae, and the propodus is shorter and broader.

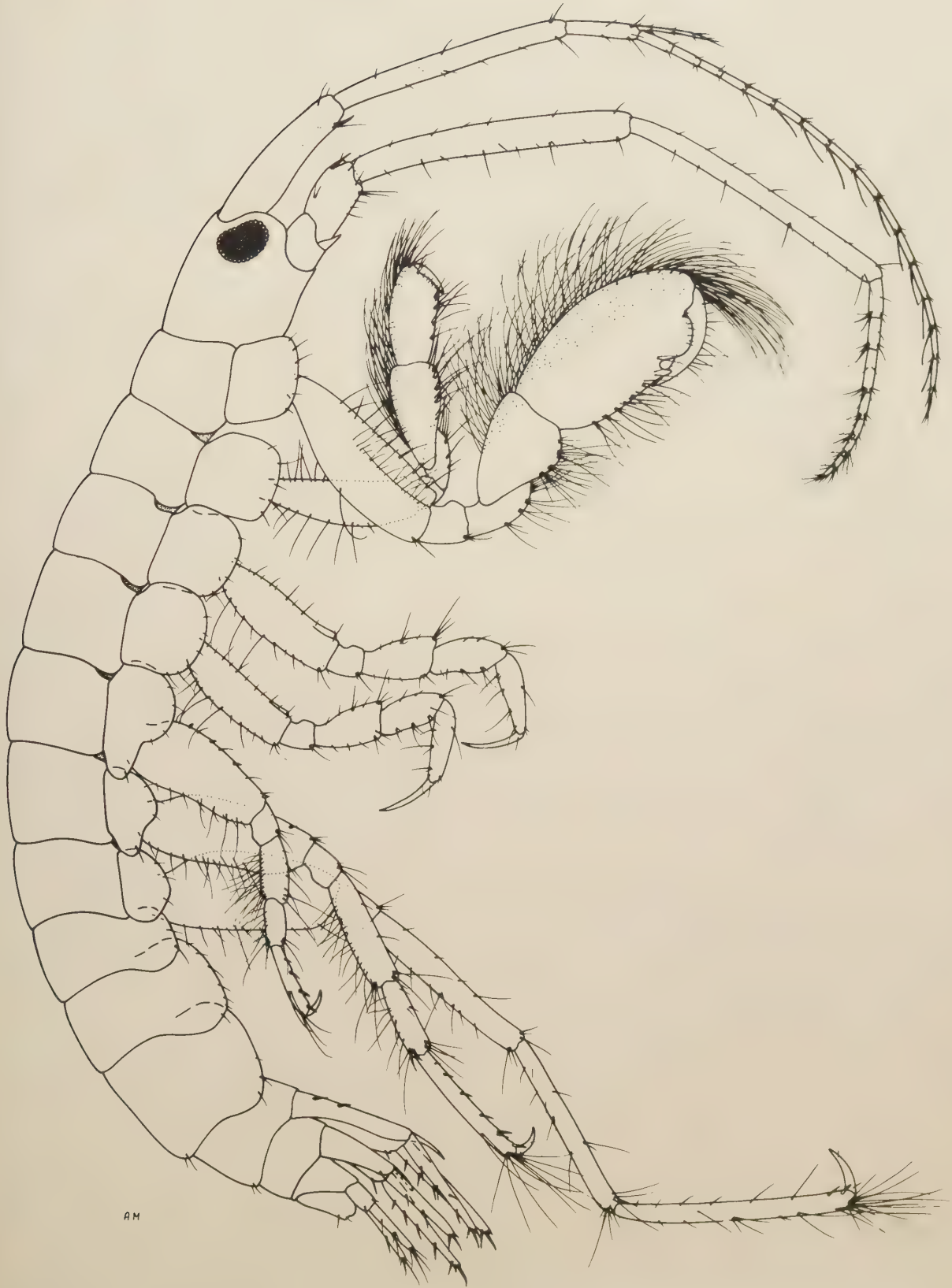

Figure 15. *Lembos brunneomaculatus mackinneyi* Myers. ♂; Dauphin Island, Alabama; NMC 14153.

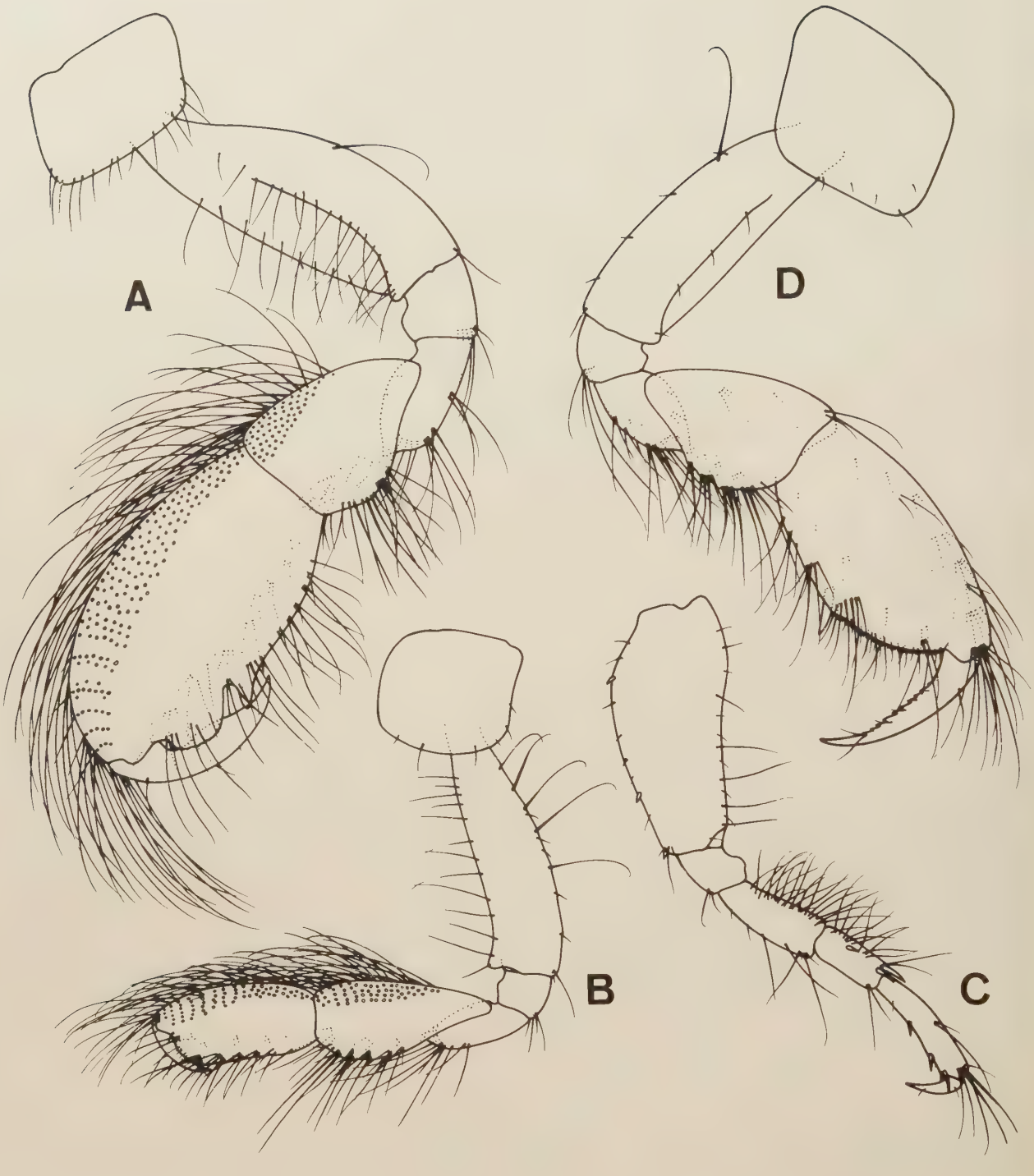

Figure 16. *Lembos brunneomaculatus mackinneyi* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; C. Pereopod 5; Dauphin Island, Alabama; NMC 14153; ♀: D. Gnathopod 1; Hourglass Station A; FSBC I 21458.

Lembos rectangulatus Myers, 1977

Figures 17, 18

Lembos rectangulatus Myers, 1977b, pp. 139-146, figs. 143-147.

Material examined: 3♂, 1♀; near East Beacon, Mullet Key, Florida; 26 February 1976; E. L. Bousfield; NMC 14154. — 3♂, 5♀; Anclote Anchorage, Florida; N. Gillies; AAM 197787.

Diagnosis: Male length 4.0 mm. Body whitish, with numerous small, reddish-brown spots (in alcohol). Pereon segment 3 with stout sternal process. Antennae delicate, slender. Gnathopod 1 basis massive, subovoid; carpus very short, cup-shaped; propodus very large, massive in terminal males, up to four and one-half times length of carpus; palm short, separated from stout posterodistal tooth by deep incision; dactylus in terminal males becoming bilobed at tip. Gnathopod 2 basis slender, anterior margin almost straight proximally, produced into distinct tooth distally, posterior margin very convex distally; carpus with anteroproximal margin strongly convex; propodus shorter than carpus; palm almost transverse; dactylus fitting palm. Pereopod 7 very elongate, one and one-half times length of pereopod 6.

Female length 4.0 mm. Gnathopod 1 propodus one and one-half times length of carpus; palm oblique; dactylus slightly overlapping palm. Gnathopod 2 carpus and propodus subequal in length; palm oblique; dactylus fitting palm.

Type-locality: Cherokee Sound, Great Abaco Island, Bahamas.

Distribution: Florida and the Bahamas. This species appears to occur only in the intertidal or very shallow sublittoral, and hence was not taken in Hourglass samples.

Remarks: This species is readily distinguishable from all other described West Atlantic *Lembos* species, except *L. unifasciatus*, *L. kunkelae*, and *L. dentischium*, by its weakly setiferous male gnathopod 2. Male *L. rectangulatus* can be distinguished from the above three species by the curious dactylus of gnathopod 1, which is swollen proximally and becomes bilobed at the tip in terminal males. It also differs in the slender basis and subrectangular carpus of gnathopod 2 and, not least, by its pigmentation in fresh material. Females lack obvious diagnostic characters but may be segregated in mixed samples containing males of this species by their pigmentation and general fascies.

Present material differs slightly from type material in its less falcate mandibular palp and somewhat longer distoventral process in uropods 1 and 2.

Lembos ovalipes Myers, 1979

Figure 19; Plate I

Lembos ovalipes Myers, 1979a, pp. 239-244, figs. 182-184.

Material examined: HOURGLASS STATION B: 3♂; 20 May 1967; dredge; (♂HOLOTYPE, USNM 172507; 2 ♂ PARATYPES, FSBC I 21460). — 1♂; 2 November 1967; dredge; FSBC I 21462. — 1♂; 20 November 1967; dredge; FSBC I 21461. — HOURGLASS STATION C: 1♂; 20 May 1967; trawl; FSBC I 21463. — 1♂; 2 June 1967; dredge; FSBC I 21464.

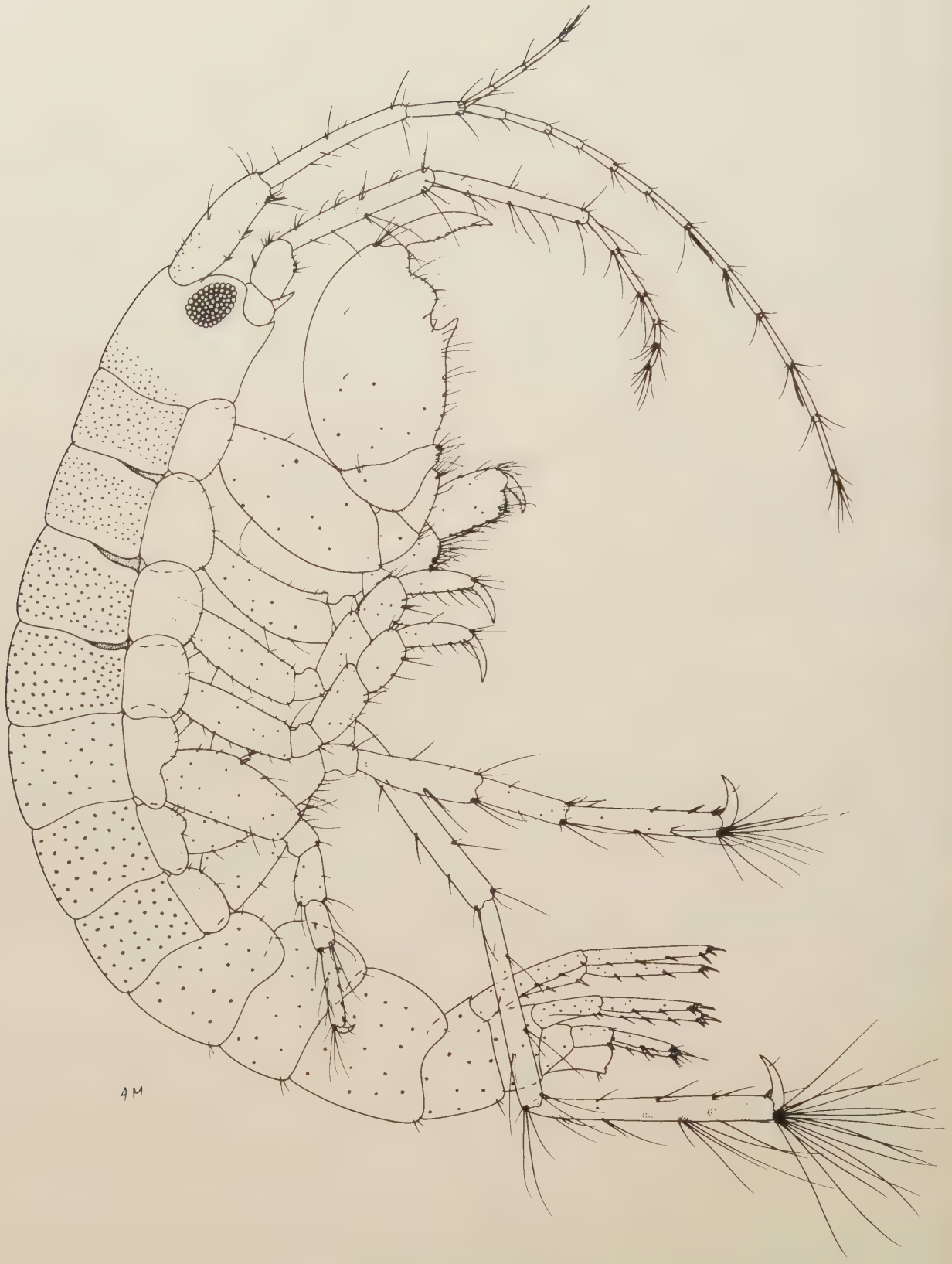

Figure 17. *Lembos rectangulatus* Myers. ♂; Mullet Key, Florida; NMC 14154.

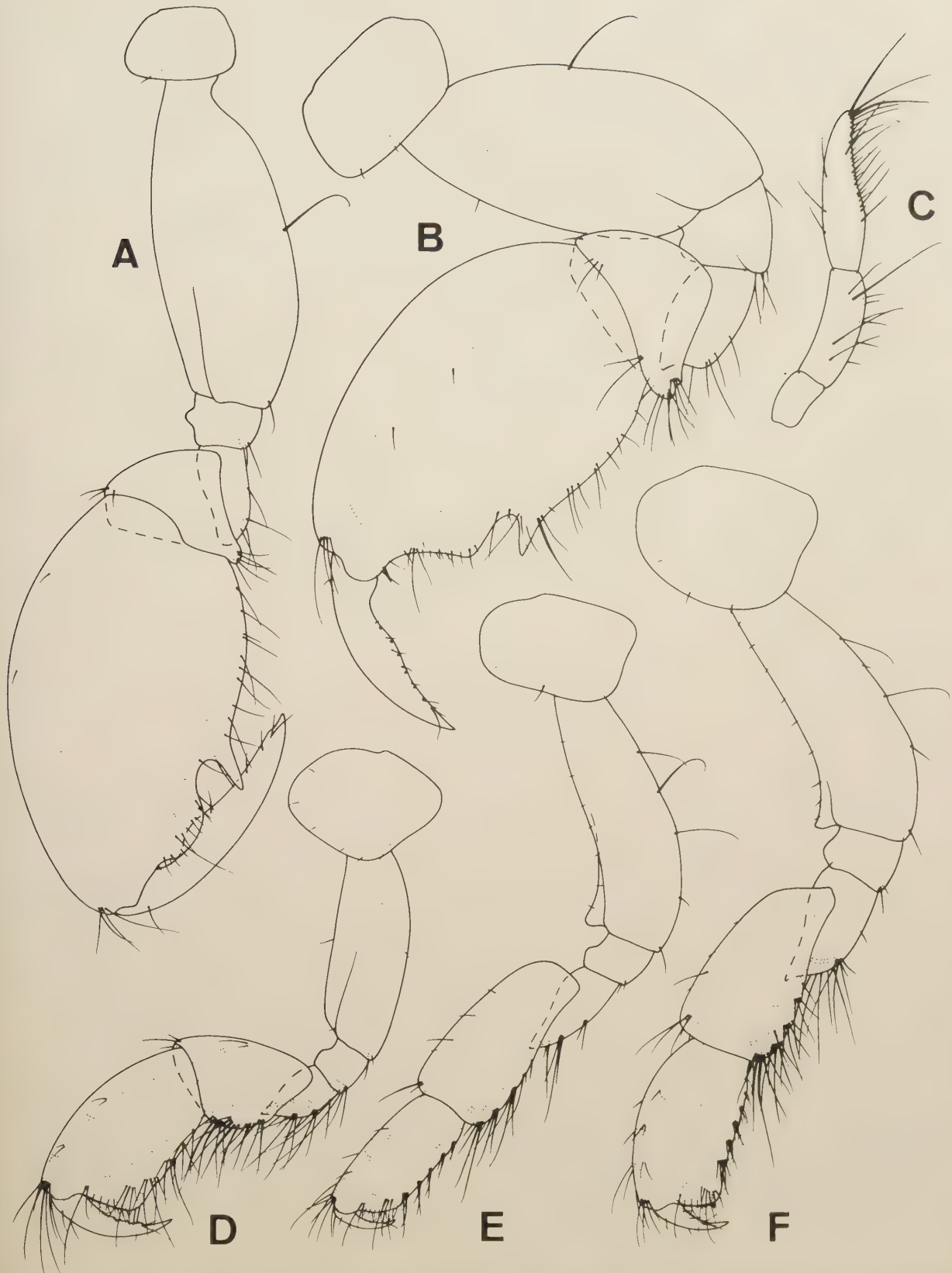

Figure 18. *Lembos rectangulatus* Myers. ♂: A. Gnathopod 1; E. Gnathopod 2; ♀: D. Gnathopod 1; St. Andrew Bay, Florida; AAM 197411; ♂: B. Gnathopod 1; C. Mandibular palp; F. Gnathopod 2; Mullet Key, Florida; NMC 14154.

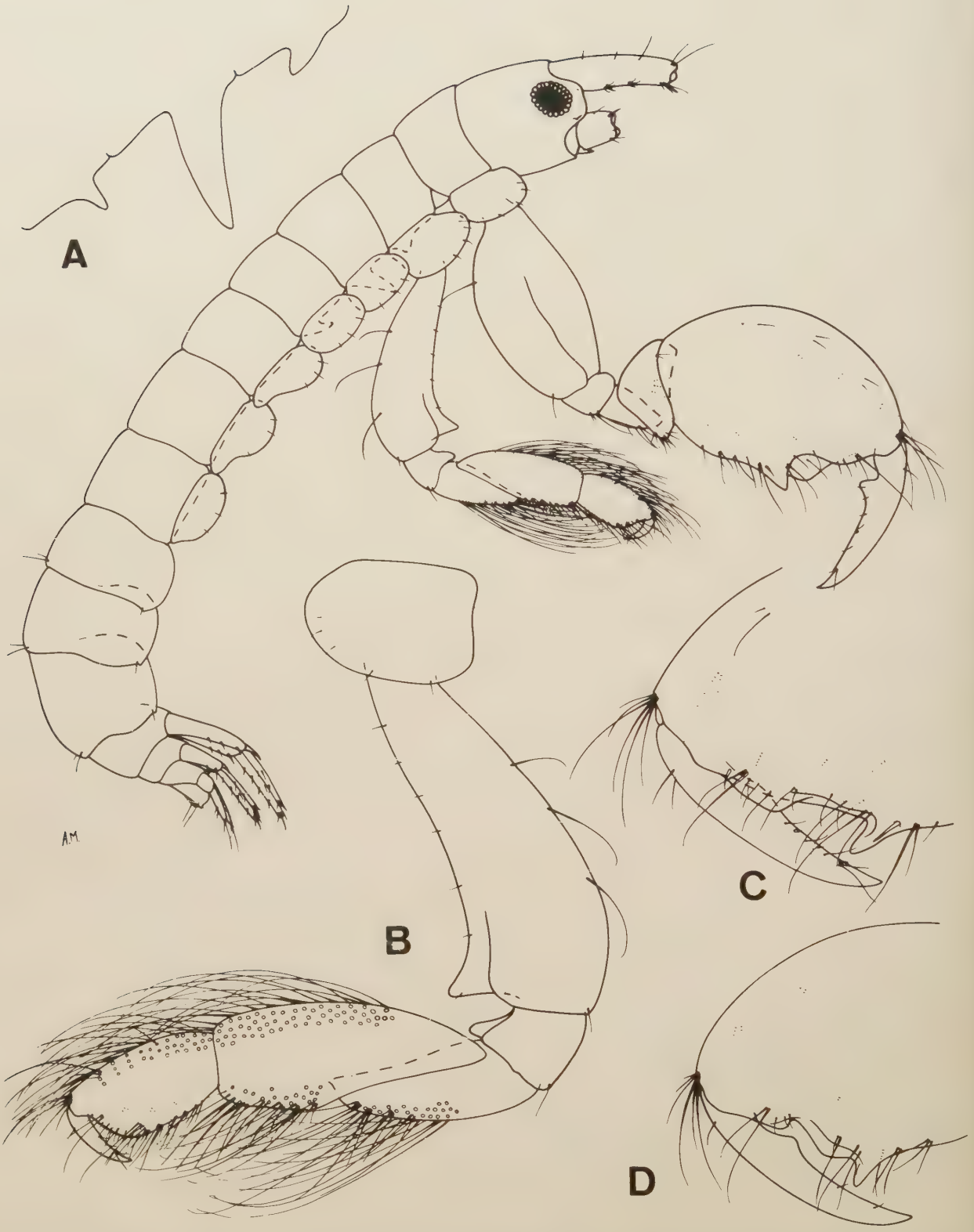

Figure 19. *Lembos ovalipes* Myers. ♂ PARATYPE: A. Pereon processes; B. Gnathopod 2; C. Gnathopod 1 palm, another specimen; D. Gnathopod 1 palm, juvenile; Hourglass Station B; FSBC I 21460.

Diagnosis: Male length 4.0 mm. Alcohol-preserved material unpigmented. Pereon segments 2-4 with sternal processes. Gnathopod 1 basis swollen, subovoid; carpus extremely short, cup-shaped; propodus massive, nearly four times length of carpus, subovoid, posterodistal margin produced into small tooth, separated from short palm by long, flat-bottomed depression confined mainly to outer face; small flange of variable development extending forward on inner face, overlapping inner face of dactylus when in closed position; dactylus large, with rounded protrusion on posteroproximal margin, becoming very well developed in hyperadults. Gnathopod 2 basis anterior margin concave, produced distally into well-developed, triangular tooth; merus large; carpus elongate, over one and one-half times as long and distinctly broader than propodus; posterior margin of merus and anterior margin of carpus and propodus with dense clothing of long setae; palm oblique; dactylus slightly overlapping palm. Pereopods unknown.

Female unknown.

Type-locality: Hourglass Station B, 27°37′N, 83°07′W; 18 m; about 19 nmi off Egmont Key, Florida west coast.

Distribution: Central West Florida Shelf; 18-37 m.

Remarks: This species is very closely allied to *L. rectangulatus* but is readily distinguished by the strongly setose gnathopod 2 with its very elongate carpus.

Lembos setosus Myers, 1978

Figures 20, 21

Lembos setosus Myers, 1978, pp. 183-191, figs. 153-157.

Material examined: 2♂, 1♀; Tampa Bay, Florida; E. L. Bousfield; NMC 14155. — 5♂, 1♀; Anclote Anchorage, Florida; N. Gillies; AAM 197721.

Diagnosis: Male length 10.0 mm. Head, pereon, pleon, urosome, coxae, pereopods 5-7 basis, and uropod peduncles covered with pale reddish-brown chromatophores (in alcohol). Pereon segment 2 with sternal process. Gnathopod 1 basis robust, about twice as long as broad; carpus short, cup-shaped; propodus three times length of carpus, anterior margin weakly convex, posterodistal margin produced into strong, outwardly deflected tooth, separated by deep, triangular excavation from rounded palm, latter separated by small sinus from point of insertion of dactylus. Gnathopod 2 basis relatively slender, setose on distal portion of anterior margin and inner face of posterodistal margin; carpus and propodus slender, carpus longer; palm transverse, evenly convex; anterior margins of carpus and propodus densely clothed in long setae; dactylus fitting palm. Pereopods 5-7 length ratios 2:3:5. Pereopod 6 with long, filamentous setae on posterior margin of basis, anterior margin of ischium and anterior and posterior margins of merus and carpus. Pereopod 7 with profusion of long setae on anterior and posterior margins of basis, anterior margin of ischium, and anterior and posterior margins of merus and carpus.

Female length 10.0 mm. Gnathopod 1 carpus over one-half length of propodus; propodus subovoid; palm extremely oblique, defined by short, triangular tooth; dactylus scarcely overlapping palm. Gnathopod 2 propodus scarcely longer than carpus; palm short, transverse; dactylus fitting palm. Pereopods 6-7 lacking long, filamentous setae on ischium, merus, and carpus.

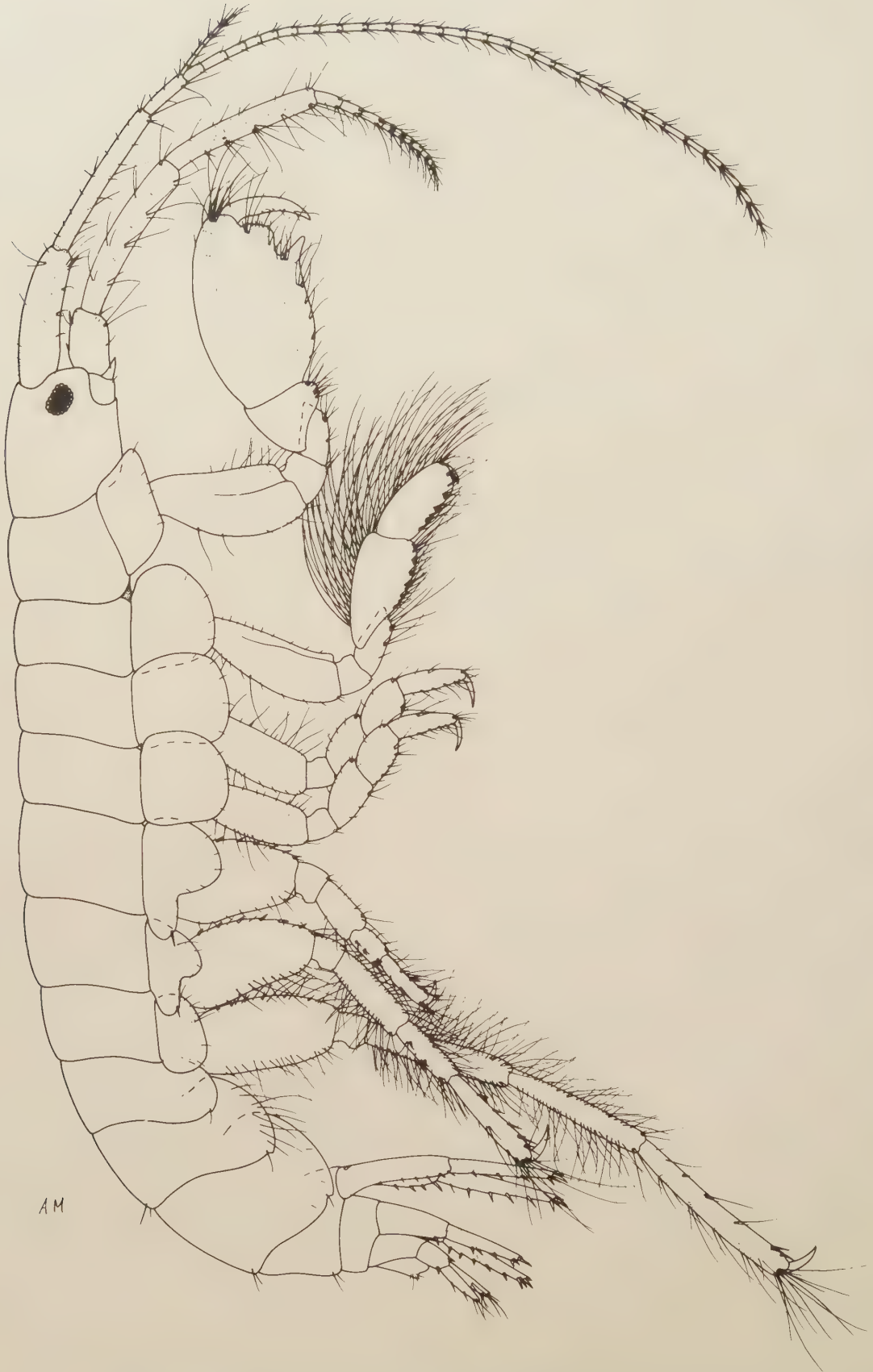

Figure 20. *Lembos setosus* Myers. ♂; Anclote Anchorage, Florida; AAM 197721.

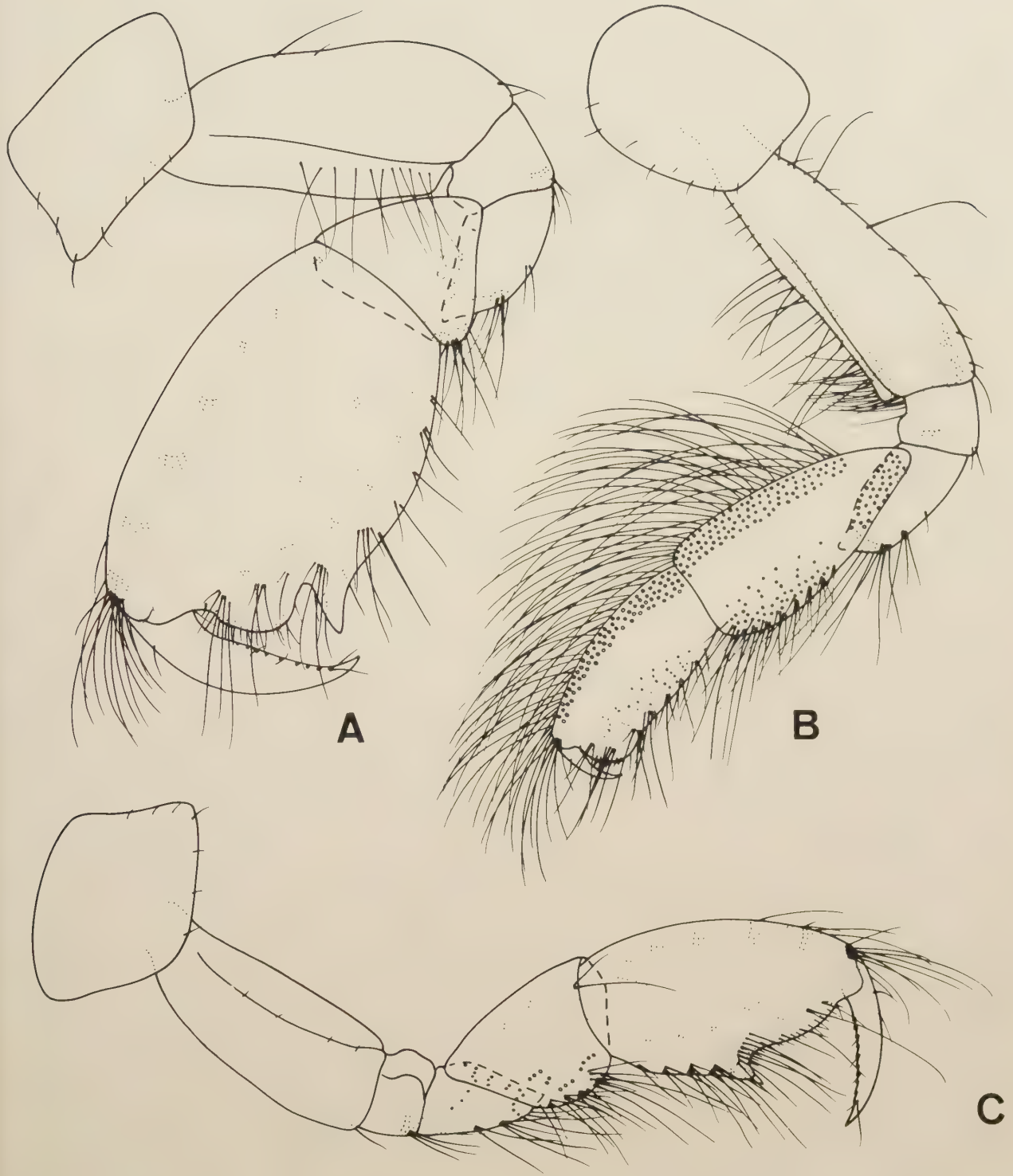

Figure 21. *Lembos setosus* Myers. ♂: A. Gnathopod 1; B. Gnathopod 2; ♀: C. Gnathopod 1; Anclote Anchorage, Florida; AAM 197721.

Type-locality: St. Andrew Bay, Florida.

Distribution: Florida west coast; apparently entirely intertidal and hence not collected during the Hourglass Cruises.

Remarks: The strongly setose pereopods 6 and 7 of the male of this species are highly characteristic. Only *L. minimus* and *L. brunneomaculatus* possess similarly setose pereopods, and in these latter species, the filamentous setae are restricted to the posterior margins. In addition, the almost transverse and highly convex palm of the male gnathopod 2 and the configuration of the male gnathopod 1 propodus are characteristic.

The presence of a tooth on the posterior margin of the propodus of the female gnathopod 1 is characteristic of several species of West Atlantic *Lembos*, viz., *L. smithi*, *L. brunneomaculatus*, *L. kunkelae*, *L. foresti* Mateus and Mateus, 1966, and *L. tigrinus*. Only in *L. setosus* and *L. brunneomaculatus* is the propodus subovoid, and *L. setosus* may be distinguished from the latter species by the short, transverse palm and short, stout dactylus of gnathopod 2.

Lembos smithi (Holmes, 1905)

Figures 22, 23

Autonoe sp. Smith, 1873, p. 562.

Autonoe smithi Holmes, 1905, pp. 516, 517, unnumbered fig.

Lembos smithi: Stebbing, 1906, p. 737; Bousfield, 1973, p. 170, pl. 51, fig. 1; Myers, 1977a, pp. 95-102, figs. 112-116.

Material examined: HOURGLASS STATION A: 1♂; 3 April 1967; dredge; FSBC I 21548. — 5♂, 2♀; 11 May 1967; dredge; FSBC I 21549. — 1♂; 1 July 1967; dredge; FSBC I 21550. — 3♂, 1♀; 5 October 1967; dredge; FSBC I 21551. — HOURGLASS STATION B: 1♀; 3 August 1965; dredge; FSBC I 21552. — 1♀; 3 January 1966; dredge; FSBC I 21553. — 1♀; 7 February 1966; dredge; FSBC I 21554. — 1♂; 7 February 1966; trawl; FSBC I 21555. — 1♀; 3 March 1966; trawl; FSBC I 21556. — 1♀; 18 October 1966; dredge; FSBC I 21557. — 1♀; 1 December 1966; trawl; FSBC I 21558. — 1♀; 13 December 1966; dredge; FSBC I 21559. — 1♂; 13 December 1966; trawl; FSBC I 21560. — 6♂, 2♀; 6 January 1967; trawl; FSBC I 21562. — 1♂; 20 January 1967; dredge; FSBC I 21561. — 1♀; 5 February 1967; dredge; FSBC I 21563. — 1♂; 5 February 1967; trawl; FSBC I 21564. — 3♀; 2 March 1967; dredge; FSBC I 21565. — 1♀; 3 April 1967; dredge; FSBC I 21566. — 4♀; 11 April 1967; dredge; FSBC I 21567. — 2♀; 11 May 1967; trawl; FSBC I 21568. — 2♀; 20 May 1967; dredge; FSBC I 21569. — 1♂, 2♀; 2 June 1967; dredge; FSBC I 21570. — 1♀; 20 June 1967; trawl; FSBC I 21571. — 1♂, 1♀; 1 August 1967; dredge; FSBC I 21572. — 2♂, 5♀; 11 August 1967; dredge; FSBC I 21573. — 1♂; 11 September 1967; trawl; FSBC I 22032. — 13♀; 2 November 1967; dredge; FSBC I 21574. — 1♀; 20 November 1967; dredge; FSBC I 21575. — HOURGLASS STATION C: 1♀, 1 immature; 27 March 1966; trawl; FSBC I 21576. — 1♀; 2 May 1966; dredge; FSBC I 21577. — 1♂; 1 December 1966; dredge; FSBC I 21578. — 1♂; 2 March 1967; dredge; FSBC I 21579. — 1♀; 14 March 1967; trawl; FSBC I 21580. — 1♂; 5 October 1967; dredge; FSBC I 21581. —1♀; 25 October 1967; trawl; FSBC I 21582. — 1♀; 21 November 1967; dredge; FSBC I 21583. — HOURGLASS STATION D: 1♂; 8 February 1966; dredge; FSBC I 21584. — 1♀; 8 February 1966; trawl; FSBC I 21585. — 1♀; 4 March 1966; dredge; FSBC I 21586. — 2♂, 1♀; 27 March 1966; dredge; FSBC I 21587. — 1♀; 11 August 1966; dredge; FSBC I 21588. — 2♀; 9 November 1966; dredge; FSBC I 21589. —3♂, 3♀; 6 February 1967; dredge; FSBC I 21590. — 1♂; 6 February 1967; trawl; FSBC I 21591. — 6♂, 6♀; 3 March 1967; dredge; FSBC I 21592. — 1♂, 1♀; 15 March 1967; dredge; FSBC I 21593. — 2♂, 3♀; 4 April 1967; dredge; FSBC I 21594. — 1♂; 4 April 1967; trawl; FSBC I 21595. — 1♂, 1♀; 12 May 1967; dredge; FSBC I 21596. — 1♂, 3♀; 3 June 1967; dredge; FSBC I 21597. — 3♂, 2♀; 21 June 1967; dredge; FSBC I 21598. — 2♂, 3♀; 21 June 1967; trawl; FSBC I 21599. — 1♂, 4♀; 25 August 1967; trawl; FSBC I 21600. — 3♂, 4♀; 1 September 1967; dredge; FSBC I 21601. — 3♂, 2♀; 1 September 1967; trawl; FSBC I 21602. — 2♂; 6 October 1967; dredge; FSBC I 21603. — 1♂; 27 October 1967; dredge; FSBC I 21604. — 2♀; 27

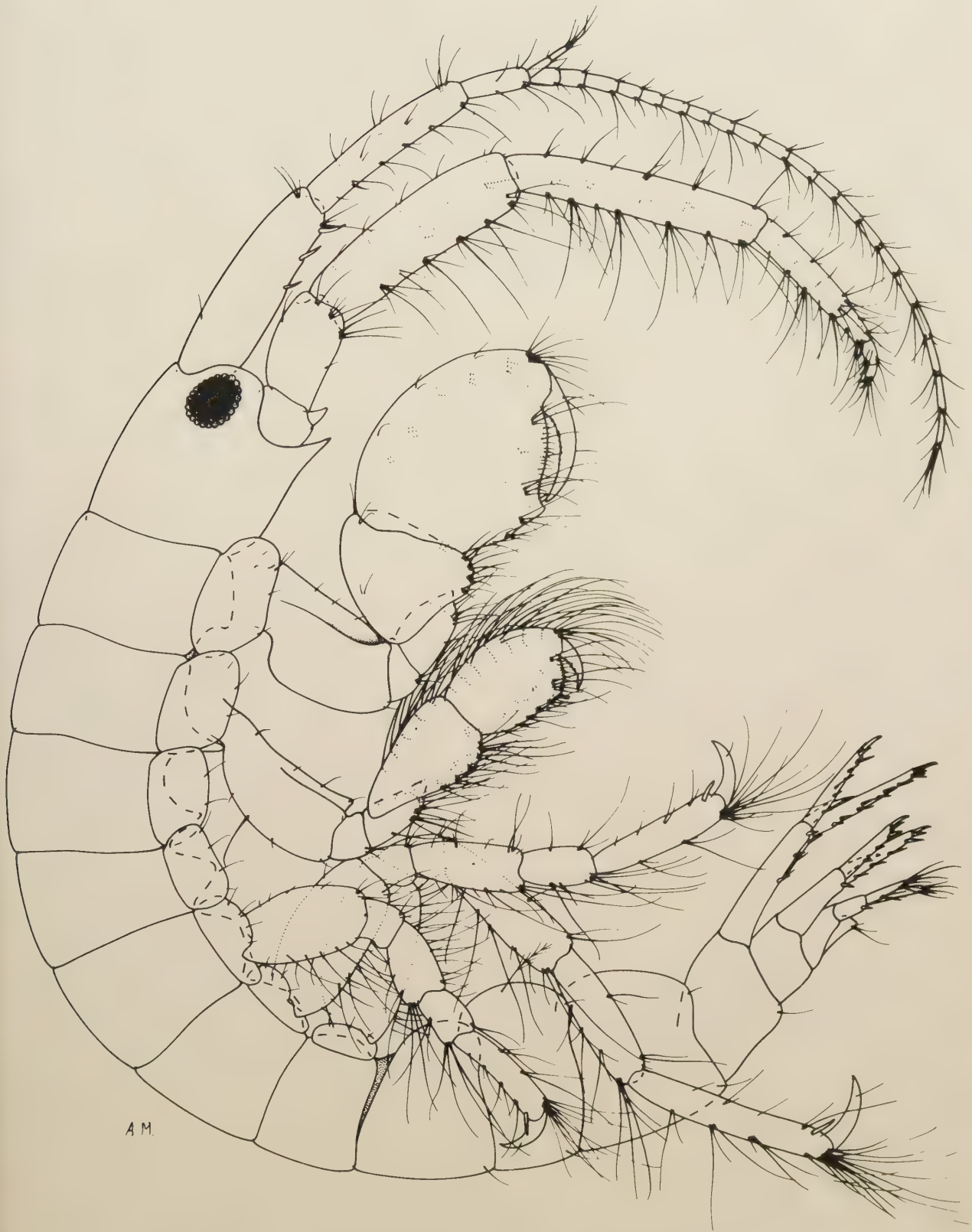

Figure 22. *Lembos smithi* (Holmes). ♂; Hourglass Station I; FSBC I 21615.

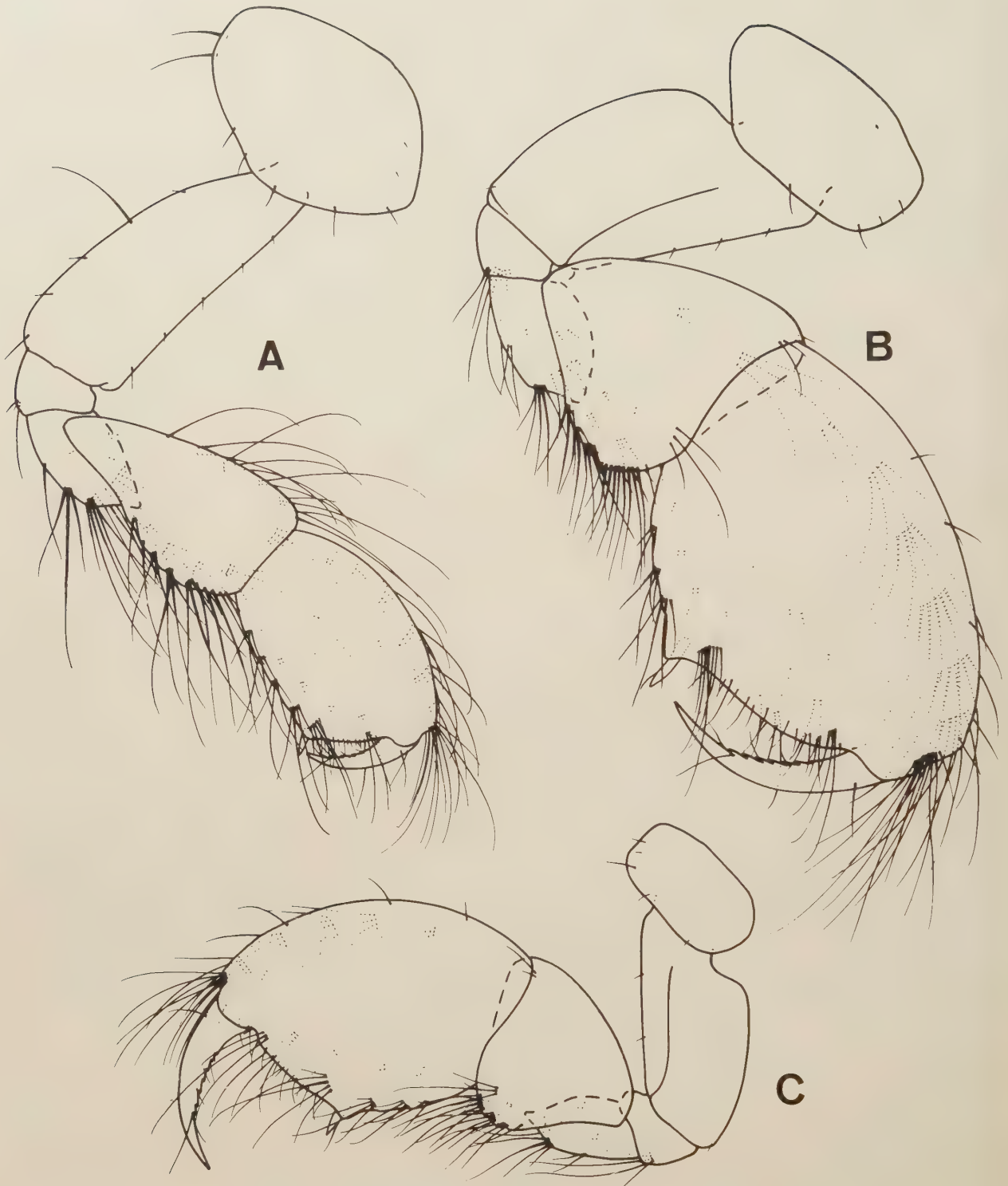

Figure 23. *Lembos smithi* (Holmes). ♀: A. Gnathopod 2; B. Gnathopod 1; ♂: C. Gnathopod 1; ♀ ; Hourglass Station I; FSBC I 21615.

October 1967; trawl; FSBC I 21605. — 1♀; 3 November 1967; trawl; FSBC I 21606. — 6♂, 2♀; 21 November 1967; dredge; FSBC I 21607. — 3♂, 4♀; 21 November 1967; trawl; FSBC I 21608. — HOURGLASS STATION E: 1♂; 2 August 1967; dredge; FSBC I 21609. — 5♂, 3♀; 1 September 1967;

trawl; FSBC I 21610. — 2♂, 4♀; 6 October 1967; dredge; FSBC I 21611. — 2♀; 3 November 1967; dredge; FSBC I 21612. — HOURGLASS STATION I: 1♂, 1♀; 14 February 1966; dredge; FSBC I 21613. — 1♂, 1♀; 9 March 1966; trawl; FSBC I 21614. — 7♂, 11♀; 15 May 1967; dredge; FSBC I 21615. — 1♂; 7 August 1967; dredge; FSBC I 21616. — 1♂; 4 September 1967; dredge; FSBC I 21617. — 1♀; 14 November 1967; dredge; FSBC I 21618. — HOURGLASS STATION J: 1♂; 11 May 1966; trawl; FSBC I 21619. — 1♂; 6 December 1966; dredge; FSBC I 21620. — 1♂; 6 December 1966; trawl; FSBC I 21621. — 1♂, 1♀; 8 March 1967; dredge; FSBC I 21622. — 1♂, 3♀; 7 April 1967; dredge; FSBC I 21623. — 1♀; 15 May 1967; dredge; FSBC I 21624. — 1♀; 5 July 1967; dredge; FSBC I 21625. — 1♀; 6 August 1967; scuba; FSBC I 21626. — 4♂, 5♀; 14 November 1967; dredge; FSBC I 21627. — HOURGLASS STATION K: 2♂, 1♀; 7 April 1967; dredge; FSBC I 21628. — 1♂; 6 June 1967; dredge; FSBC I 21629. — 1♂, 1♀; 7 August 1967; trawl; FSBC I 21630. — 2♂, 1♀; 4 September 1967; dredge; FSBC I 21631. — OTHER MATERIAL: 1♀; 27 February 1975; Tampa Bay, Florida; K. Thoemke; NMC 14156. — 1♂; 26 February 1976; Tampa Bay, Florida; E. L. Bousfield; NMC 14157. — 5♀; 14 October 1976; 38 nmi west of Egmont Key, Florida, 27°36.2′N, 83°31.0′W; 39 m; dredge; NMC 14158. — 2♂, 2♀; 29 March 1978; approximately 27 nmi off Captiva Island, Florida, 26°32′N, 82°41.5′W; 25 m; dredge; medium-fine, shelly sand; E. L. Bousfield; NMC 14159. — 1♀; 28 March 1978; approximately 92 nmi due west of Sanibel Island, Florida, 26°24′N, 83°42′W; 73 m; dredge; mostly coarse sand; E. L. Bousfield; NMC 14160. — 6♂, 2♀; 29 March 1978; approximately 51 nmi due west of Sanibel Island Light, Florida, 26°23.5′N, 82°59.5′W; 39 m; dredge; shell sand; E. L. Bousfield; NMC 14161.

Diagnosis: Male length 5.5 mm. In life, body and appendages with diffuse, reddish-brown colouration, particularly strongly developed on gnathopod 1. Body and coxae with blackish pigment, lighter on pereon segment 5 and pleon; dorsal side of body also crossed with purple, orange, or rose bars; both pairs of antennae conspicuously marked with spots of red, pink, or orange (from Holmes, 1905). In alcohol, only brownish dorsal bands on pereon segments 1-4 and 6-7, weak brown pigmentation on pleon, and brown blotches on coxae remain. Pereon segments 2-6 with sternal processes, anterior ones tooth-like, posterior ones little more than ridges. Gnathopod 1 basis very robust, about one and one-half times as long as broad; carpus short; propodus more than twice length of carpus, massive, about two-thirds as broad as long, inner face with groups of very long setae; palm sinuous, defined by distinct, triangular tooth; dactylus strongly curved, fitting palm. Gnathopod 2 basis with anterior margin straight; carpus longer than propodus; propodus subovoid; anterior margins of carpus and propodus densely clothed in long setae; dactylus short, fitting palm. Pereopods 5-7 length ratios 2:3:4.

Female length 6.0 mm. Very similar to male, but gnathopod 2 carpus and propodus subequal, propodus more rectangular.

Type-locality: Vineyard Sound, Massachusetts.

Distribution: South side of Cape Cod to northern Florida; Gulf of Mexico from Florida to Yucatan; status in tropical Florida unknown. Estuaries to 73 m in the Hourglass study area.

Remarks: The characteristic gnathopod 1 of both sexes immediately distinguishes this species from any other currently known northern Gulf *Lembos*.

Genus *Microdeutopus* Costa, 1853

Microdeutopus myersi Bynum and Fox, 1977

Figures 24, 25

Microdeutopus sp. nov.? Myers, 1969, pp. 127-129, figs. 13-15, 20.

Microdeutopus sp. Fox and Bynum, 1975, p. 225.

Microdeutopus myersi Bynum and Fox, 1977, pp. 28-31, figs. 17, 18.

Material examined: HOURGLASS STATION B: 1♂; 20 November 1967; dredge; FSBC I 21476. — HOURGLASS STATION D: 3♀; 1September 1967; dredge; FSBC I 21477. — HOURGLASS STATION E:1♂; 2 August 1967; dredge; FSBC I 21478.— HOURGLASS STATION J: 2♂, 1♀; 14 November 1967; dredge; FSBC I 21479. — HOURGLASS STATION K: 1♀; 5 July 1967; dredge; FSBC I 21480. — HOURGLASS STATION L: 1♂; 8 August 1967; dredge; FSBC I 21481. — 1♀; 5 September 1967; dredge; FSBC I 21482. — 1♂; 15 November 1967; trawl; FSBC I 21483. — OTHER MATERIAL: 1♂, 2♀; 1974; Tampa Bay, Florida; K. Thoemke; NMC 14162. — 2♂, 3♀; 3 May 1976; Anclote Anchorage, Florida; N. Gillies; AAM 1976102. — 1♂, 1♀; 28 September 1976; Anclote Anchorage, Florida; N. Gillies; AAM 1976103. — 1♂, 1♀; 28 March 1978; approximately 92 nmi due west of Sanibel Island Light, Florida, 26°24′N, 83°42′W; 73 m; dredge; mostly coarse sand; E. L. Bousfield; NMC 14163.

Diagnosis: Male length 4.0 mm. Alcohol-preserved material unpigmented. Pereon segments 2-6 with sternal processes. Antenna 1 primary flagellum with about 13 articles, accessory flagellum with up to 4 articles, terminal article rudimentary. Antenna 2 slender, flagellum with about 5 articles. Gnathopod 1 coxa shallow, strongly produced anteriorly, acute; basis with anteroproximal margin produced into convex flange, becoming crenulate in hyperadults; merus short, subtriangular in juveniles, becoming elongate and subrectangular in hyperadults; carpus enormous, anterior margin with well-developed median tooth, posterior margin with three posterodistal teeth, distalmost largest; propodus in juveniles over two-thirds length of carpus, with small tooth defining palm, in hyperadults about one-third length of carpus, with strong, variable, rounded tooth defining palm and several smaller accessory teeth on posterior margin; dactylus in juveniles about two-thirds length of propodus, in hyperadults becoming equal in length to propodus; posterior margin of merus with dense clothing of very long setae; posterior margins of carpus and propodus with few, very long setae. Gnathopod 2 basis in juveniles with anterior margin straight or weakly concave, in hyperadults with anterior margin strongly concave and produced distally into rounded tooth; carpus elongate, parallel-sided; propodus in juveniles only slightly shorter than carpus, in hyperadults only two-thirds length of carpus; palm distinct, almost transverse in juveniles, becoming short and more transverse in hyperadults; posterior margin of merus and posterior and anterodistal margins of carpus with dense clothing of very long setae. Pereopods 3-4 merus with "brush" of long setae on posterior margin. Pereopods 5-7 length ratios 7:10:12.

Female length 4.0 mm. Gnathopod 1 coxa deeper than that of male, quite strongly produced anterodistally; carpus and propodus slender, subequal; dactylus greatly overlapping palm. Gnathopod 2 carpus and propodus subequal; dactylus short, fitting palm.

Type-locality: Bogue Sound, Morehead City, Cartaret County, North Carolina.

Distribution: Central West Florida Shelf through tropical Florida to North Carolina; estuaries to 73 m.

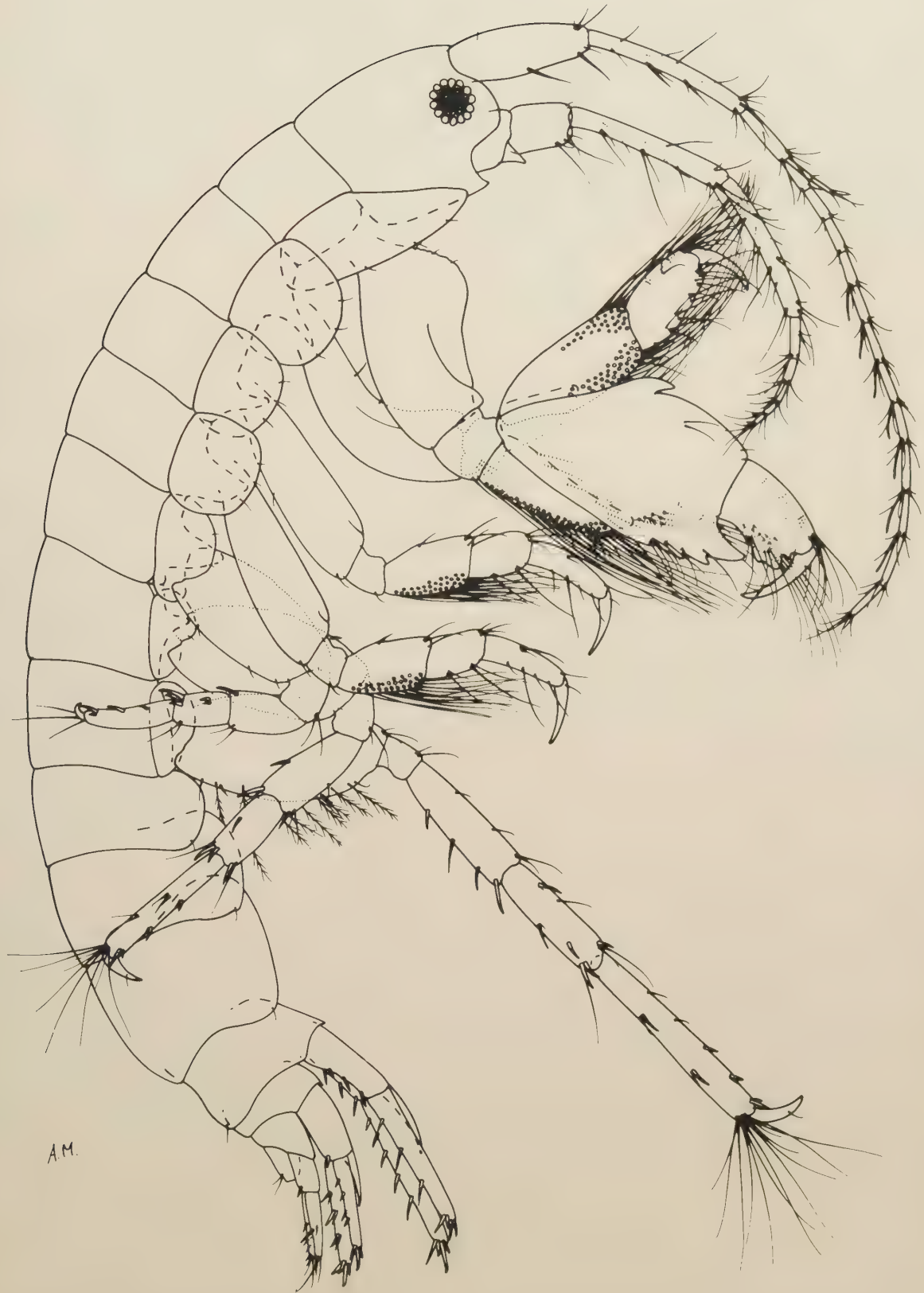

Figure 24. *Microdeutopus myersi* Bynum and Fox. ♂; Anclote Anchorage, Florida; AAM 1976102.

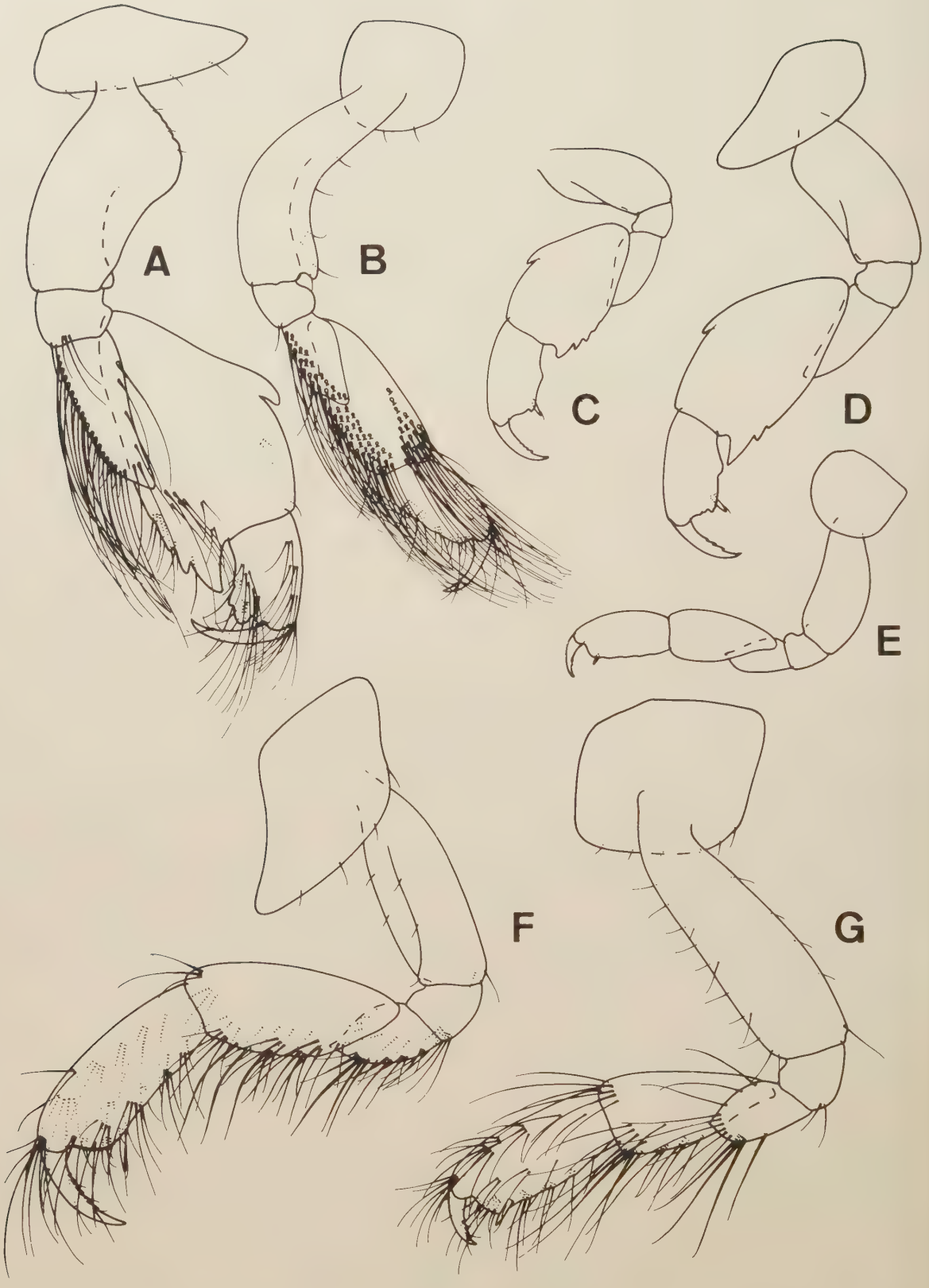

Figure 25. *Microdeutopus myersi* Bynum and Fox. ♂: A. Gnathopod 1; B. Gnathopod 2; C, D. Gnathopod 1, juveniles; E. Gnathopod 2, juvenile; ♀: F. Gnathopod 1; G. Gnathopod 2; Anclote Anchorage, Florida; AAM 1976102.

Remarks: Bynum and Fox (1977) pointed out several differences between *M. myersi* and the *Microdeutopus* sp. nov. of Myers (1969). These differences are the triangular merus of *M. myersi* as compared with the rectangular merus of *Microdeutopus* sp. nov., the larger propodus of *M. myersi*, which also lacks a strong defining tooth, and the shorter, stouter dactylus of *M. myersi*. These differences are almost certainly due to allometric growth during maturation, since in present material, hyperadults closely approximate the material described by Myers (1969) as *Microdeutopus* sp. nov., while juvenile material more closely approximates the description of *M. myersi* given by Bynum and Fox (1977). The female gnathopods figured by Bynum and Fox differ radically from those described herein, and furthermore are very different from those of any other known species in the "*schmitti*" group of *Microdeutopus*, so that some doubt must be cast on the assignment of the females described by Bynum and Fox to *M. myersi*. If it can be shown that the females were correctly assigned, then the question of synonymy will have to be reopened.

Genus *Rildardanus* Barnard, 1969

Rildardanus laminosa (Pearse, 1912)

Figures 26, 27; Plate I

Unciola laminosa Pearse, 1912, pp. 377, 378, fig. 7; Shoemaker, 1945, pp. 454-456, fig. 5.

Rildardanus laminosa: Barnard, 1973, p. 22.

Material examined: HOURGLASS STATION A: 1♀; 31 August 1966; dredge; FSBC I 21487. — 1♀; 11 May 1967; dredge; FSBC I 21488. — HOURGLASS STATION B: 1♀; 3 January 1966; dredge; FSBC I 21489. — 1♂; 11 May 1967; trawl; FSBC I 21490. — 1♀; 11 August 1967; dredge; FSBC I 21491. — 1♂; 2 November 1967; dredge; FSBC I 21492. — HOURGLASS STATION D: 1♀; 3 March 1967; dredge; FSBC I 21493. — 1♂; 25 August 1967; trawl; FSBC I 21494. — HOURGLASS STATION J: 1♀; 7 April 1967; dredge; FSBC I 21495. — 1♂, 1♀; 14 November 1967; dredge; FSBC I 21496. — OTHER MATERIAL: 1♂, 1♀; 30 March 1978; 15 nmi off Englewood, Sarasota County, Florida, 26°57.4′N, 82°39.5′W; 20 m; dredge; E. L. Bousfield; NMC 14166. — 3♂, 3♀; 7 April 1978; Dauphin Island, Alabama; Reid Garrett; NMC 14167.

Diagnosis: Male length 4.0 mm. In life, head, body, and coxae with reddish-brown patches; dactylus of gnathopod 1 with deep red, dorsal, proximal blotch. Rostrum prominent, extending slightly beyond eye lobes; low, forward-projecting lobe on either side of rostrum, extending over dorsal surface of eye lobe; columnar process below rostrum. Antenna 2 elaborate; article 3 strongly expanded dorsoventrally and laterally, dorsal margin produced into narrow process armed distally with tooth or spine, distal margin outer face forming rounded, crenulate lobe, inner margin of upper, forward-pointing lobe curving back across top of article, continuing downward in broad, rounded curve to form inner distal margin of article, outer and inner margins of curve armed with short, stout spines; article 4 inner margin divided into two lobes by shallow sinus, produced forward into prominent lobe bearing strong distal spine, entire margin armed with short, stout spines; article 5 unarmed; flagellum of about 5 articles. Gnathopod 1 palm convex; proximal defining lobe large, finger-like. Gnathopod 2 palm transverse. Uropods 1 and 2 with inner ramus vestigial. Uropod 3 with peduncle unproduced, single ramus very reduced.

Female length 5.0 mm. Antenna 2 article 4 with outer margin divided medially into two lobes by deep sinus; proximal lobe bearing distal spine. Gnathopod 1 article 6 with palm crenulate, indented by rather deep, angular sinus; defining lobe armed with stout spine.

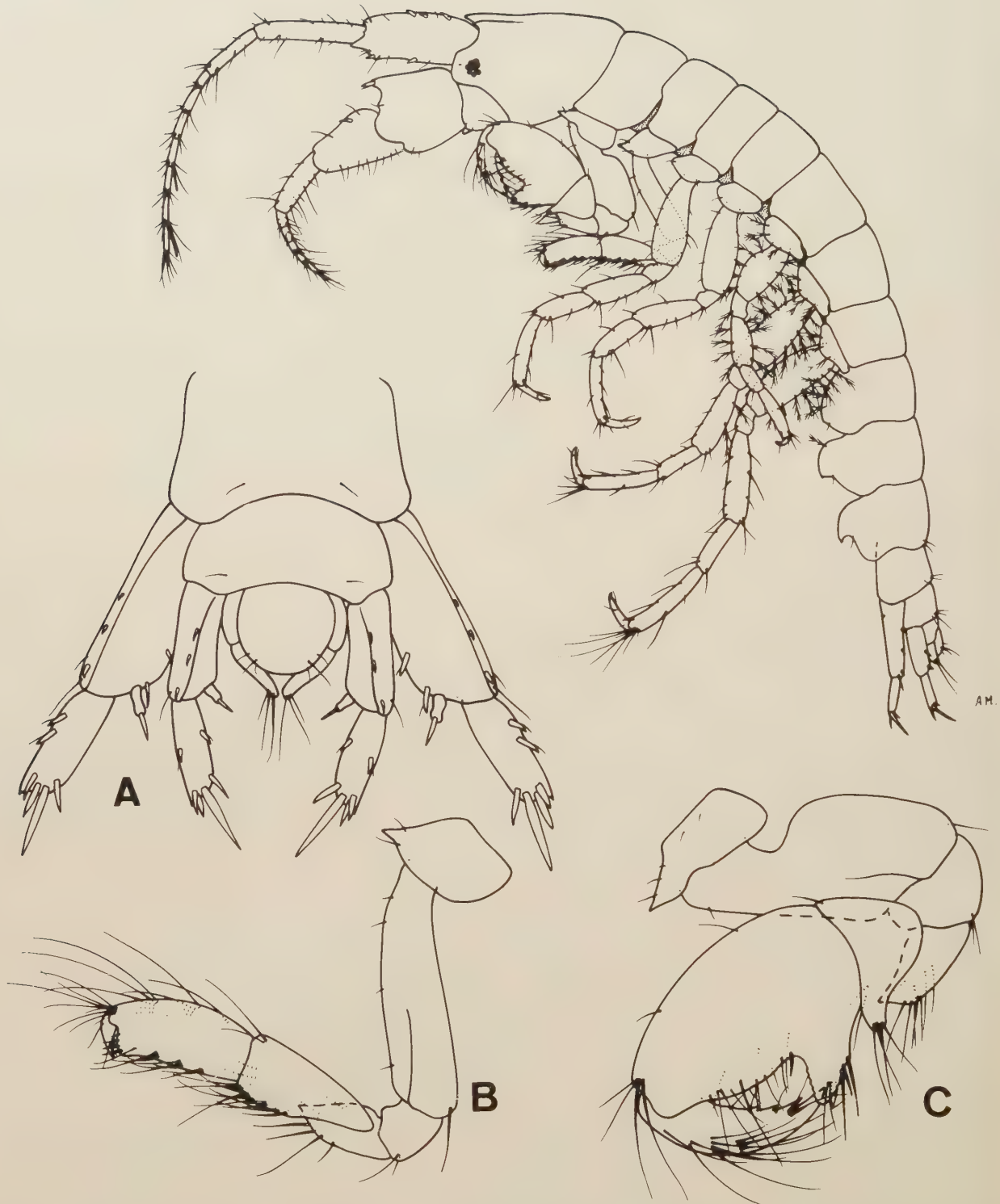

Figure 26. *Rildardanus laminosa* (Pearse). ♂; A. Urosome, dorsal view; B. Gnathopod 2; C. Gnathopod 1; Dauphin Island, Alabama; NMC 14167.

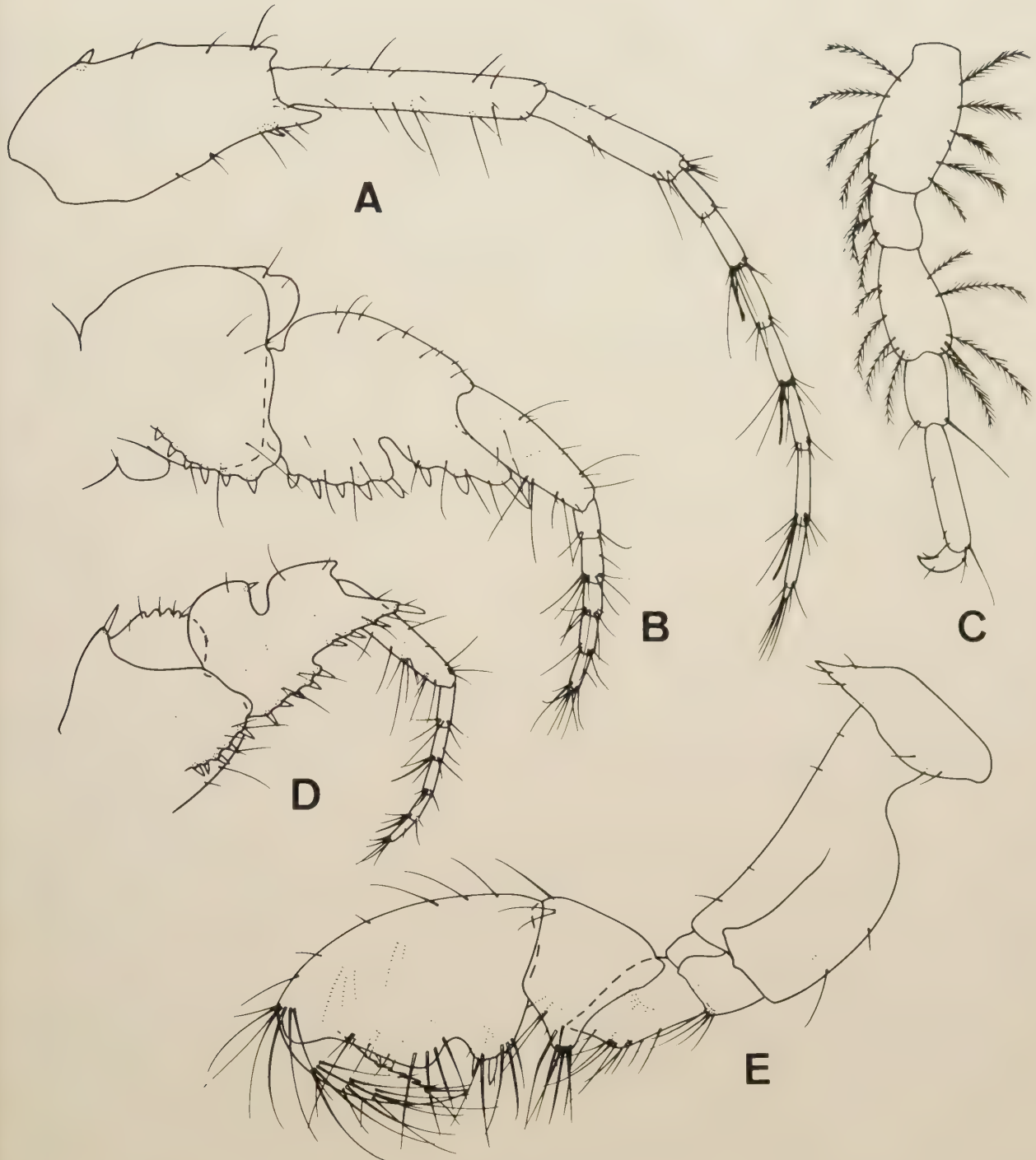

Figure 27. *Rildardanus laminosa* (Pearse). ♂: A. Antenna 1; B. Antenna 2; C. Pereopod 5; ♀ : Antenna 2; E. Gnathopod 1; Dauphin Island, Alabama; NMC 14167.

Type-locality: Punta Rassa, Charlotte Harbor, Florida.

Distribution: Alabama; central West Florida Shelf; 6-55 m depths in Hourglass study area.

Remarks: *Rildardanus laminosa* is easily recognised by the characteristic antenna 2. The genus *Rildardanus* was erected by Barnard (1969) to include the single Pacific species *R. tros* Barnard. Later (Barnard, 1973), the generic diagnosis was revised to allow inclusion of *Unciola laminosa* Pearse. The genus is distinguished from *Unciola* Say, 1818, by its vestigial accessory flagellum, heavily ornamented antenna 2, shortened inner ramus of uropods 1 and 2, unexpanded peduncle of uropod 3, and vestigial ramus of uropod 3.

Liocuna, new genus

Diagnosis: Coxae shallow, noncontiguous; coxa 1 produced anteriorly. Rostrum triangular, longer than eye-lobes; eyes absent. Antenna 1 peduncular article 1 with distoventral tooth; antenna 2 peduncular articles 1-3 unornamented; other antennal articles unknown. Mandibular palp slender, 3-articulate, article 2 longest, article 3 unexpanded. Labium mandibular lobes short. Gnathopod 1 powerful, subchelate, carpus not markedly reduced. Gnathopod 2 weak, scarcely subchelate. Pereopods 3-7 basis very weakly expanded; pereopods 3-4 propodus longer than carpus. Pleopod rami weakly expanded, peduncle with coupling spines. Epimera 1-3 toothed. Uropods 1-2 biramous; uropod 3 lacking ramus, peduncle unexpanded. Telson broad, rounded.

Type-species: *Liocuna caeca*, described below.

Composition: Presently monotypic.

Etymology: *Liocuna* is an anagram of *Unciola*; the gender is feminine.

Remarks: In its relatively unmodified antennae 1 and 2, *L. caeca* resembles *Pterunciola* Just, 1977, but differs markedly from that genus in bearing toothed epimera, a mandibular palp with article 2 the longest, and pereopods 3 and 4 with propodus longer than carpus. *Pseudunciola* Bousfield, 1973, also has weakly modified antenna 2 and, like *Liocuna*, lacks eyes. *Pseudunciola* differ from *Liocuna*, however, in its uniramous uropod 2, typical uncioliform uropod 3 peduncle, reduced carpus of gnathopod 1 and unexpanded bases of pereopods 3-7. *Liocuna* agrees with *Rildardanus* in its unexpanded peduncle and lack of ramus on uropod 3, but resembles *Unciola* in its fully biramous uropods 1 and 2. It differs from both genera in its apparently unornamented antennae.

The polythetic nature of the *Unciola*-like genera, already pointed out by Just (1977), makes their interrelationships difficult to assess. The reduction in uropod rami, coxae, and accessory flagellum may well have occurred independently in more than one "*Unciola*" evolutionary line, convergence due to simple reduction being common in the Amphipoda.

Liocuna caeca, new species

Figures 28, 29

Material examined: HOURGLASS STATION D: 1♀; 19 May 1966; trawl; FSBC I 22031. — 1♀; 6 October 1967; trawl; FSBC I 21484. — HOURGLASS STATION E: 1 juvenile; 6 October 1967;

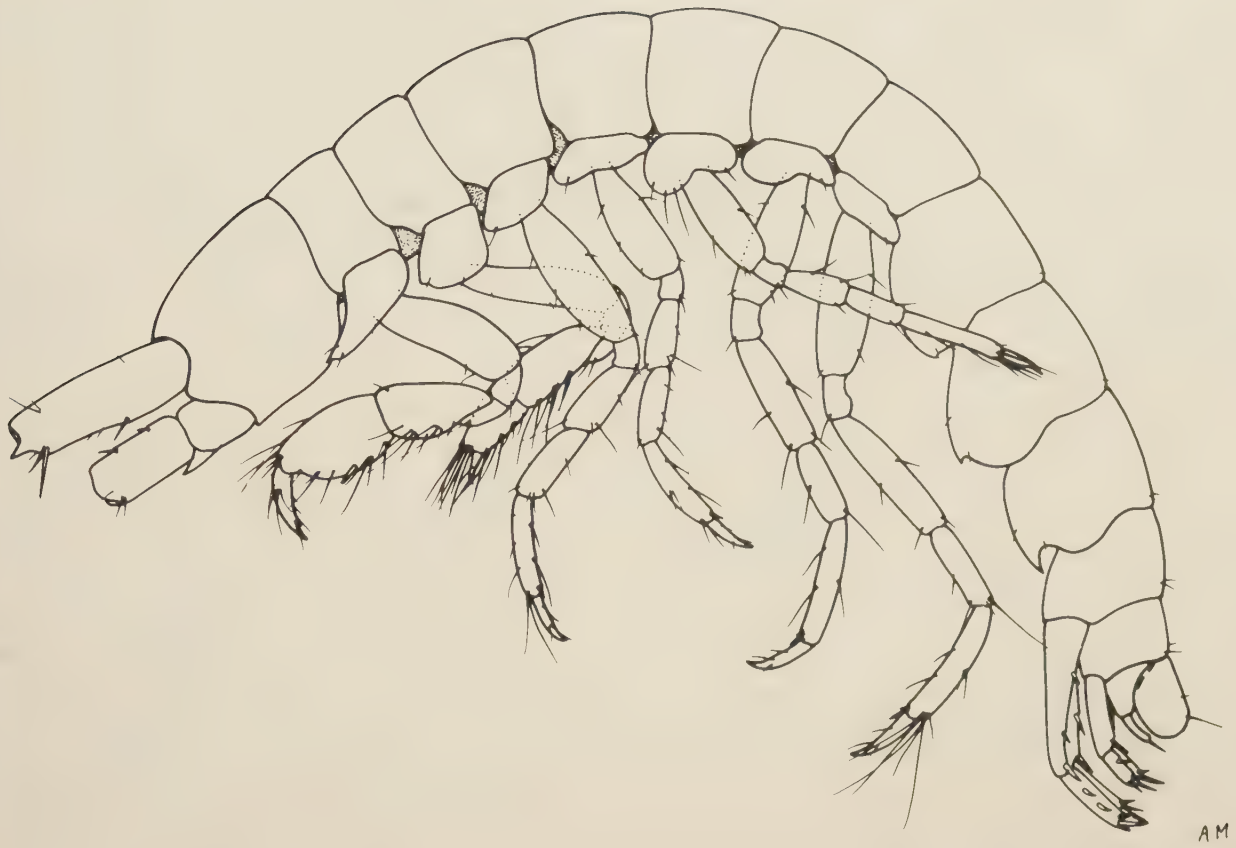

Figure 28. *Liocuna caeca* n. sp. Sub-terminal ♀ PARATYPE; 26°23.5′N, 82°59.5′W; 39 m; NMC 14165.

dredge; FSBC I 21485. — HOURGLASS STATION L: 1♀; 15 November 1967; trawl; FSBC I 21486. — OTHER MATERIAL: 6♀; 29 March 1978; approximately 51 nmi due west of Sanibel Island Light, Florida, 26°23.5′N, 82°59.5′W; 39 m; dredge; shell sand; E. L. Bousfield; (HOLOTYPE, NMC 14164; 5 PARATYPES, NMC 14165).

Description: Female 5.0 mm. Body unpigmented in alcohol. Lateral cephalic lobes moderately produced, angular; eyes absent. Rostrum triangular, extending beyond eye lobes. Antenna 1 peduncular article 1 elongate, with small, acute, distal tooth; remaining articles unknown. Antenna 2 peduncular article 3 normal, unornamented; remaining articles unknown. Mandibular palp slender, article length (basi-distal) ratios 2:5:3; article 3 rod-shaped, with two long, terminal setae. Maxilla 1 inner plate leaf-like, with two long, stout setae, numerous short, fine setae. Gnathopod 1 coxa shallow, strongly produced anteriorly, acute; basis robust, anterior margin weakly concave; carpus slightly longer than broad; propodus slightly longer than carpus; palm straight, minutely serrate, almost transverse in hyperadults, oblique in small, ovigerous females and juveniles, posterior margin with strong medial spine, dactylus stout, with strong subdistal tooth, additional accessory tooth sometimes on posterior margin. Gnathopod 2 coxa as deep as broad (deeper than broad in hyperadults), rounded or with small anterodistal tooth; carpus one and one-half times length of propodus; propodus narrower distally, with anterodistal "brush" of long setae; dactylus stout, with straight basal region and curved distal portion. Pereopod 3 coxa subquadrangular; basis elongate; dactylus two-thirds length of propodus, posterior margin with subdistal tooth and pair of long, stout setae. Pereopod 4 coxa shallow, with anterior and posterior lobes; basis shorter than that of pereopod 3. Pereopods 5-7 length ratios 4:6:7. Epimera 2, 3 with posterodistal margin produced into strong, acute, curved tooth. Pleopod peduncles each with pair of coupling spines. Uropods 1, 2 biramous, outer ramus slightly

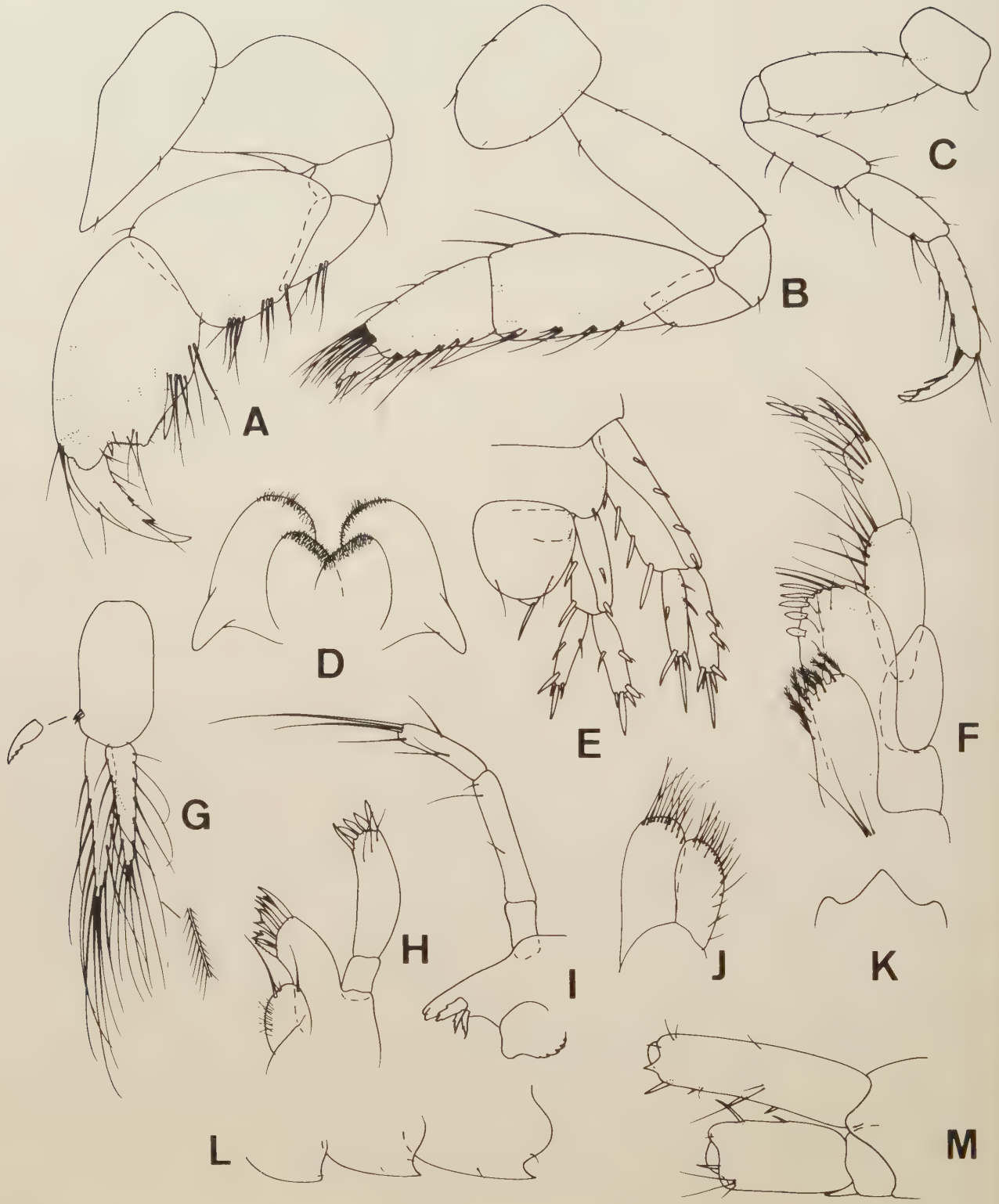

Figure 29. *Liocuna caeca* n. sp. ♀ PARATYPE: A. Gnathopod 1; B. Gnathopod 2; C. Pereopod 3; D. Labium; E. Urosome, dorsal view; F. Maxilliped; G. Pleopod; H. Maxilla 1; I. Mandible; J. Maxilla 2; K. Rostrum; L. Epimera 1-3; M. Head; 26°23.5′N, 82°59.5′W; 39 m; NMC 14165.

longer. Uropod 3 peduncle not expanded distally, lacking ramus, with strong spine on outer edge of distal margin. Telson posterior margin evenly rounded.

Male unknown.

Type-locality: 26°23.5'N, 82°59.5'W; 39 m; 51 nmi west of Sanibel Island Light, Florida west coast.

Distribution: Central West Florida Shelf; 39-73 m.

Etymology: The name of this species is derived from the Latin *caecum*, meaning blind, and refers to the complete absence of eyes.

Genus *Unciola* Say, 1818

Unciola serrata Shoemaker, 1945

Figures 30, 31; Plate I

Unciola serrata Shoemaker, 1945, pp. 464, 465, fig. 9; Bousfield, 1973, pp. 176, 177, pl. 52, fig. 2.

Material examined: HOURGLASS STATION D:1♂; 21 May 1967; dredge; FSBC I 21497. — 1♀; 1 September 1967; dredge; FSBC I 21498. — OTHER MATERIAL: 2♂; 7 April 1978; Dauphin Island, Alabama; Reid Garrett; NMC 14168.

Diagnosis: Male length 7.0 mm. In life, dorsal surface of body traversed with deep reddish bands, antennae with blotches and rings of same colour, base of dactylus of gnathopod 1 with large, dorsal, deep red blotch. Rostrum prominent, extending slightly beyond eye lobes. Antenna 2 article 3 with two strong, distal teeth, one dorsally, one ventrally, pair of smaller teeth situated medioventrally, one on either side of ventral margin of article 4, lower margin with 2-3 spines, inner face with 3 spines, additional spine at base of outer medioventral tooth; article 4 inner lateroventral margin with series of strong serrations and row of spines, another series of spines above on inner face; article 5 strongly spinose; flagellum subequal with peduncular article 5. Gnathopod 1 propodus posterior margin with small, rounded, distal and proximal lobes. Gnathopod 2 propodus with short, convex, fimbriate palm. Epimera 1-3 each with strong, distoventral tooth. Uropod 3 uniramous, peduncle with strong, inner distal process almost equal in length to ramus, terminating in two long setae.

Female length 8.0 mm. Antenna 2 stout, not ornamented with teeth; article 4 with two rows of spines on inner ventral face; article 5 with row of inner ventral spines; flagellum slightly longer than peduncular article 5. Gnathopod 1 posterior margin with slight median protuberance and bilobed proximal process bearing stout spine; carpus with bilobed process on posterior margin.

Type-locality: Skull Creek, Port Royal Sound, South Carolina.

Distribution: Eastern coast of the United States from Vineyard Sound to Georgia; northern Gulf of Mexico from Florida to Alabama; low water level to 55 m.

Remarks: Present material agrees well with the descriptions of Shoemaker (1945) and Bousfield (1973) and extends the known distribution to the Gulf of Mexico. The strong serrations of the male antenna 2 peduncular article 4 are diagnostic, but they can be overlooked if the intact animal is viewed from the side.

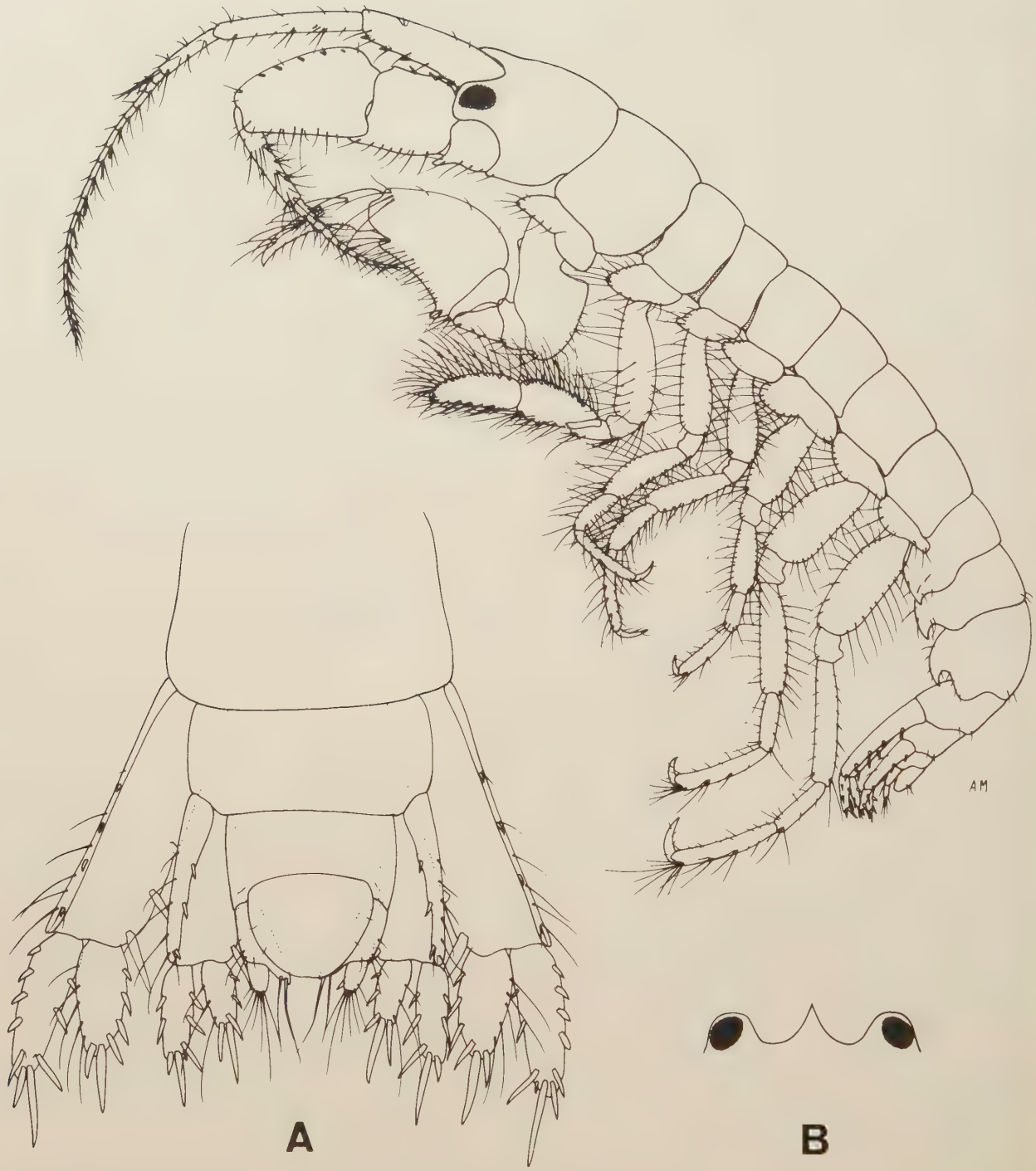

Figure 30. *Unciola serrata* Shoemaker. ♂: A. Urosome, dorsal view; B. Rostrum; Dauphin Island, Alabama; NMC 14168.

Genus *Acuminodeutopus* Barnard, 1959

Remarks: Barnard (1959) erected the genera *Acuminodeutopus* (for *A. heteruropus*) and *Rudilemboides* (for *R. stenopropodus*) and stated of their relationships that *Acuminodeutopus* "is closely related to *Microdeutopus* Costa [1853]" (p. 29), and *Rudilemboides* "is most closely related to *Lemboides* Stebbing [1895]" (p. 30). Although a broadly similar male gnathopod 1 morphology is exhibited by *Acuminodeutopus* and *Microdeutopus*, and a different gnathopod 1 morphotype is

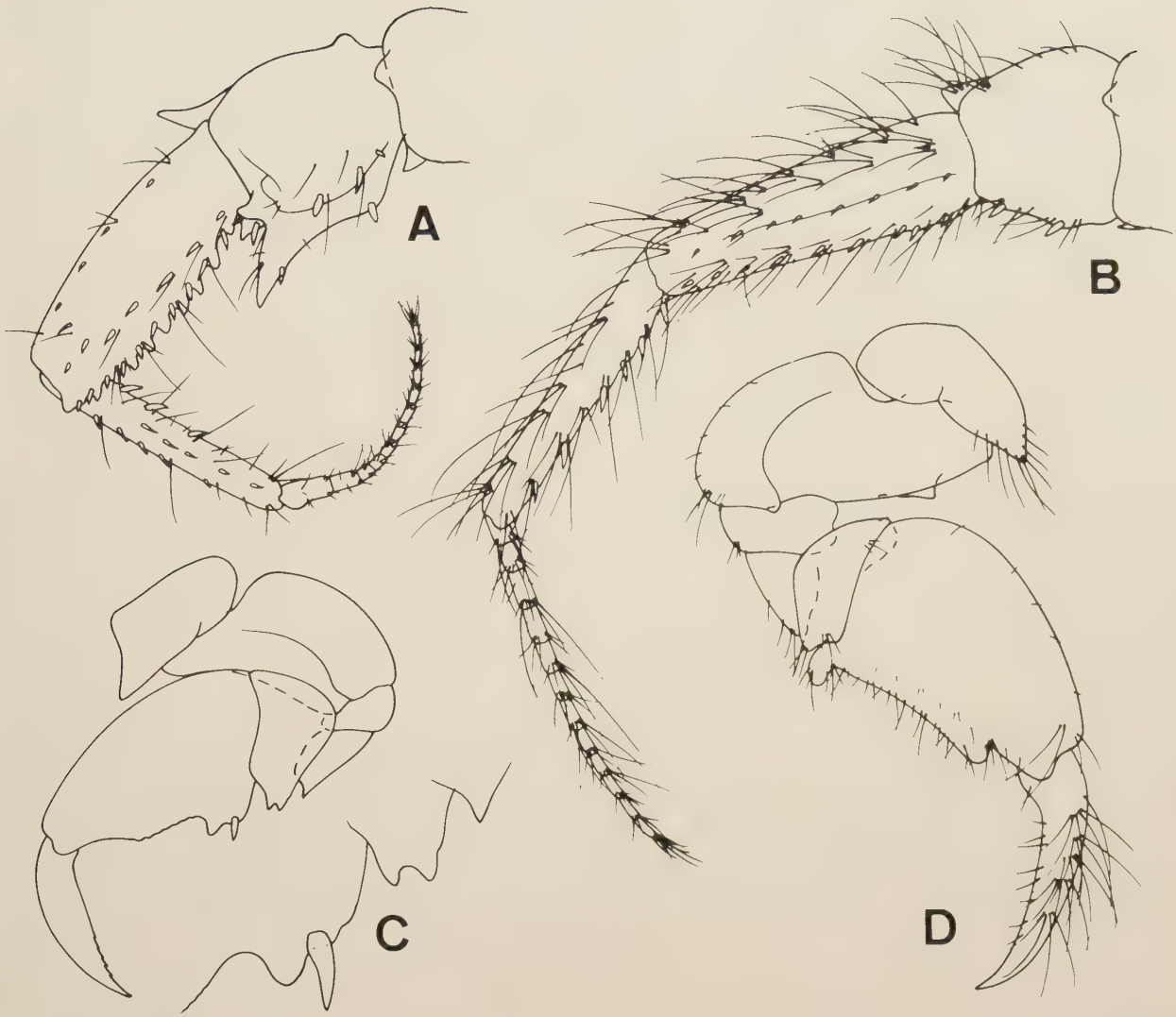

Figure 31. *Unciola serrata* Shoemaker. ♂: A. Antenna 2; D. Gnathopod 1; ♀ : B. Antenna 2; C. Gnathopod 1 (setae omitted); Dauphin Island, Alabama; NMC 14168.

shared by male *Rudilemboides* and *Lemboides*, these similarities are almost certainly due to convergence. The *Acuminodeutopus-Rudilemboides* complex is very distinct and characterised in particular by the acute head lobes and rod-shaped mandibular palp article 3.

The main characters which separate *Acuminodeutopus* and *Rudilemboides* given by Barnard (1959; 1973) are as follows: male gnathopod 1 carpus with strong posterodistal tooth in *Acuminodeutopus*, without strong tooth development in *Rudilemboides*; uropod 3 with reduced inner ramus in *Acuminodeutopus*, with subequal rami in *Rudilemboides*; accessory flagellum 2 articulate in *Acuminodeutopus*, multiarticulate in *Rudilemboides*. Reduction in one ramus of a biramous appendage occurs throughout the Amphipoda as a normal evolutionary progression and is of low phylogenetic significance. Furthermore, the phylogenetic significance of tooth development on the male aorid gnathopod 1 podomeres has recently been questioned by Myers (1979). *Rudilemboides naglei* has moderately well-developed teeth on the male gnathopod 1 carpus and is thus intermediate between *Acuminodeutopus* and *Rudilemboides*. It would seem most sensible to synonymise *Acuminodeutopus* and *Rudilemboides*, the former genus (which stands on page priority) including all

aorids with acute head lobes, rod-shaped mandibular palp article 3, and enlarged male gnathopod 1 carpus.

The revised genus *Acuminodeutopus* includes the following species: *A. heteruropus* Barnard, 1959, *A. stenopropodus* (Barnard, 1959), *A. periculosus* Barnard, 1969, and *A. naglei* (Bousfield, 1973).

Acuminodeutopus naglei (Bousfield, 1973), new combination

Figures 32, 33; Plate I

Rudilemboides naglei Bousfield, 1973, p. 171, pl. 50, fig. 1.

Material examined: HOURGLASS STATION J: 1♀; 14 November 1967; dredge; FSBC I 21456. — HOURGLASS STATION L: 1♀; 15 November 1967; dredge; FSBC I 21457. — OTHER MATERIAL: 18♂, 76♀, 16 immatures; St. Andrew Bay, Florida; C. Saloman; AAM 197786. — 1♀; 15 October 1976; 65 nmi west of Egmont Key, Florida, 27°37′N, 83°58′W; 53.9 m; E. L. Bousfield; NMC 14170. — 1♀; 29 March 1978; about 27 nmi off Captiva Island, Florida, 26°32′N, 82°41.5′W; 25 m; dredge; medium-fine, shelly sand; E. L. Bousfield; NMC 14171. — 2♂, 3♀; 7 April 1978; Dauphin Island, Alabama; Reid Garrett; NMC 14172.

Diagnosis: Female length 3.0 mm. Alcohol-preserved material unpigmented. Head with lateral lobes acute; eye large, subround. Antenna 1 equal to about half body length; flagellum with about ten articles; accessory flagellum composed of two long and one rudimentary article. Antenna 2 very slender, weakly developed (for an aorid). Gnathopod 1 slender; carpus slightly longer than propodus; dactylus fitting palm. Gnathopod 2 slender; carpus one and one-half times length of propodus; dactylus short, fitting palm. Pereopods 5-7 length ratios 7:13:18. Epimera 1-3 with small, posterodistal tooth. Male as female, but gnathopods differing as follows: gnathopod 1 basis robust; carpus enormous, subovoid, posterodistal margin produced into flange, terminating in 3 or 4 short, rounded teeth; propodus short, slender; palm oblique, with small proximal sinus at point at insertion of dactylus. Gnathopod 2 basis stout, anterior margin concave, produced into stout, triangular distal tooth; carpus elongate, parallel-sided; propodus about two-thirds length of carpus, palm almost obsolete.

Type-locality: Hadley Harbor, Naushon Island, Cape Cod, Massachusetts (E. L. Bousfield, in litt.).

Distribution: South side of Cape Cod to eastern Gulf of Mexico; low water level to 55 m.

Remarks: Although no males of this species were collected during the Hourglass Cruises, the females so closely agree with females from St. Andrew Bay (AAM 197786), the accompanying males of which are described above, that the materials are considered synonymous. Hourglass and St. Andrew Bay material differ from that described and figured by Bousfield (1973) only in the toothed epimera; Bousfield stated (1973: 171), "hind corner subquadrate, not produced or toothed."

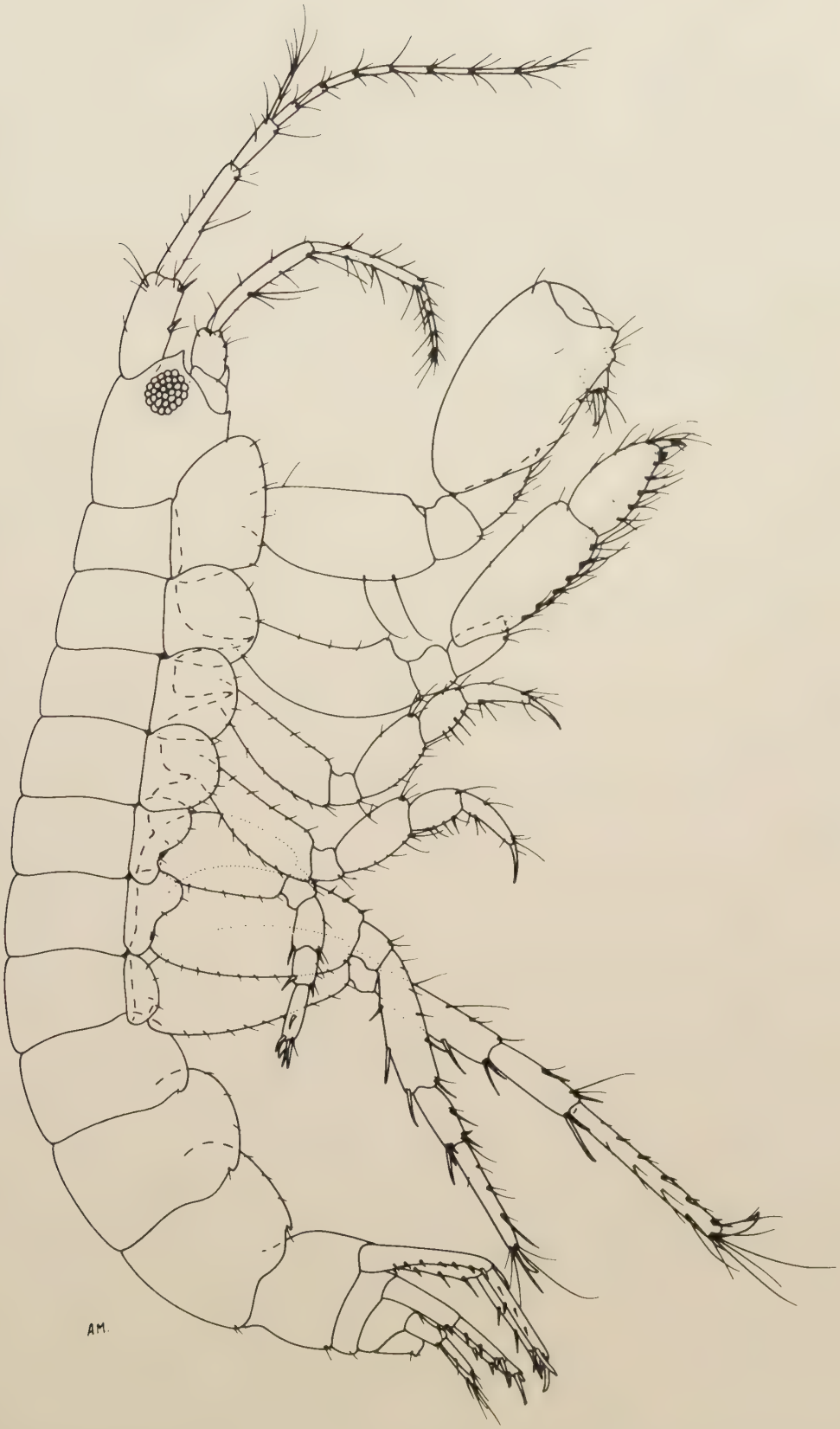

Figure 32. *Acuminodeutopus naglei* (Bousfield). ♂; St. Andrew Bay, Florida; AAM 197786.

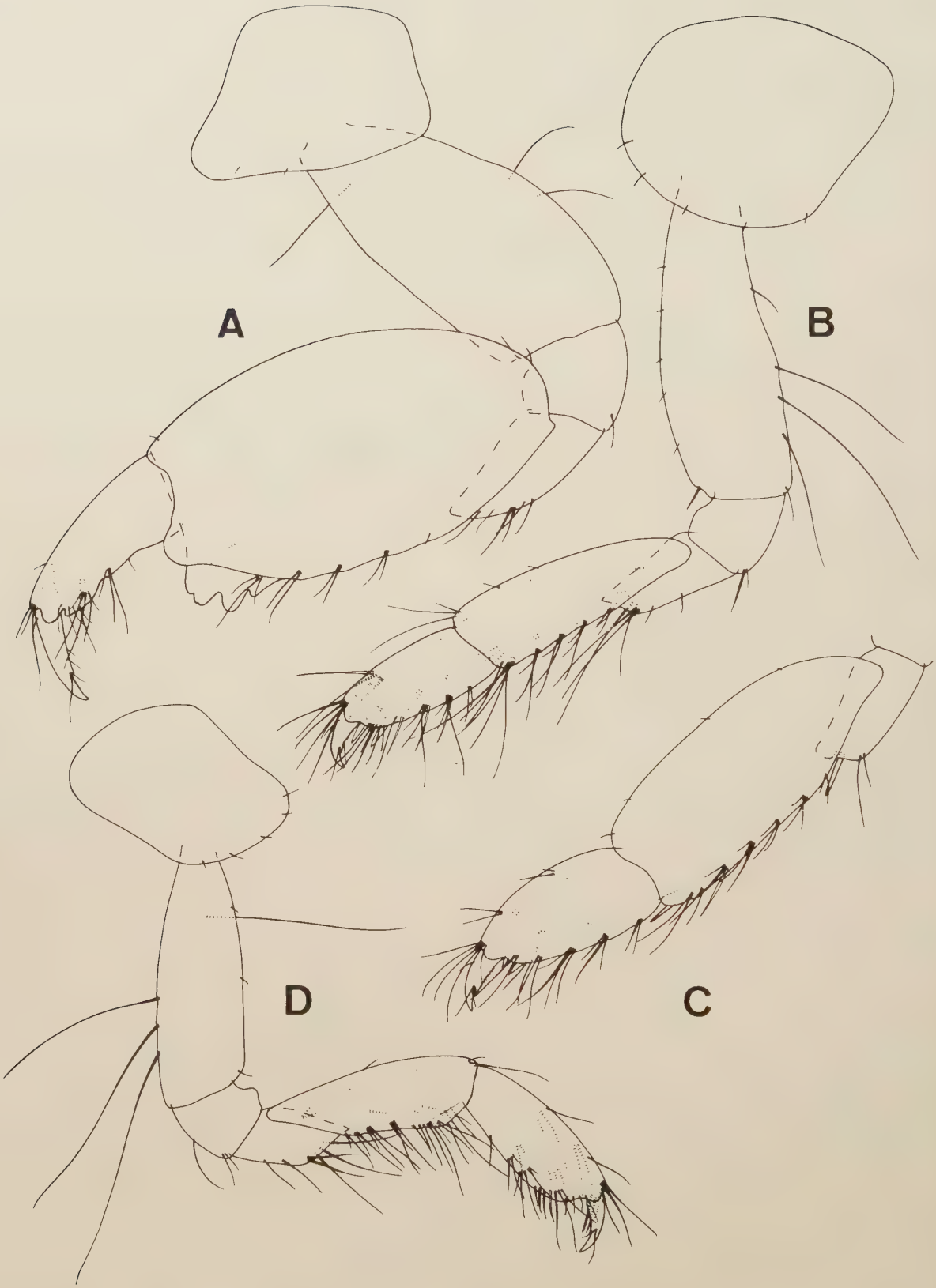

Figure 33. *Acuminodeutopus naglei* (Bousfield). ♂: A. Gnathopod 1; C. Gnathopod 2; St. Andrew Bay, Florida; AAM 197786; ♀: B. Gnathopod 2; D. Gnathopod 1; 65 nmi west of Egmont Key, Florida; NMC 14170.

DISCUSSION

ZOOGEOGRAPHY

The aorid fauna of the topical and warm-temperate west Atlantic regions is so imperfectly known that the zoogeographic relationships of the Florida shelf species cannot accurately be determined. Three species, *Lembos smithi*, *Unciola serrata*, and *Acuminodeutopus naglei* appear to be Transhatteran species (Watling, 1979) which occur from Cape Cod to north Florida, and which have gained access to the warm-temperate northern Gulf region (Table 3). Three species, *Lembos unicornis*, *L. brunneomaculatus*, and *Rildardanus laminosa*, are widely distributed in tropical and warm-temperate regions, and another species, *Microdeutopus myersi*, although apparently warm-temperate, is also known from the tropical Florida Keys. Three species, *Lembos spinicarpus*, *L. unifasciatus*, and *L. rectangulatus*, appear to be tropical species ranging into the Gulf of Mexico. It should be stressed, however, that the true distribution of aorids from the Gulf of Mexico around south Florida to the Carolinas is almost unknown, and our knowledge of tropical aorids is very fragmentary. The remaining five species, *Lembos tigrinus*, *L. tempus*, *L. ovalipes*, *L. setosus*, and *Liocuna caeca*, are so far known only from the Florida west coast, though it would be premature to regard them as endemics.

TABLE 3. GEOGRAPHIC DISTRIBUTIONS OF ALL AORIDAE KNOWN FROM THE NORTHEASTERN GULF OF MEXICO.*

	Location**							
	A	B	C	D	E	F	G	H
Lembos smithi	X	X				X	X	X
Unicola serrata	X	X				X	X	
Acuminodeutopus naglei	X	X				X	X	
Lembos unicornis		X		X	X	X		
Lembos brunneomaculatus		X	X		(X)[1]	(X)[2]	(X)[2]	
Rildardanus laminosa						X	X	
Microdeutopus myersi		X	X			X		
Lembos spinicarpus			X	X		(X)[3]		
Lembos unifasciatus			X	X	X	(X)[4]		
Lembos rectangulatus				X		X		
Lembos tigrinus						X		
Lembos tempus						X		
Lembos ovalipes						X		
Lembos setosus						X		
Liocuna caeca						X		

[1] *Lembos b. longicornis* Myers
[2] *Lembos b. mackinneyi* Myers
[3] *Lembos s. inermis* Myers
[4] *Lembos u. reductus* Myers

*Parenthesis indicate other than the nominate subspecies.

**A. Cape Cod to Cape Hatteras
B. Cape Hatteras to Florida east coast
C. Florida Keys (tropical Florida)
D. Bahamas
E. Caribbean
F. Florida west coast
G. Northern Gulf (Alabama to Texas)
H. Southwest Gulf - Yucatan

BATHYMETRY

Depth distribution of Hourglass Aoridae is depicted in Tables 4 and 6. It is not possible to determine whether the observed bathymetric distributions are directly related to depth preferences, or rather to physical-chemical parameters on the bottom. At each depth sampled, the general substrate characteristics were broadly similar at both transects, and the methods of collection employed (dredge and trawls) resulted in sampling of many microhabitats so that discrete associations have not been revealed. All stations were sampled at night each month, and in addition, Stations B, C, and D were resampled during daytime, later in the month, in order to determine diel fluctuations in catches of certain fishes and some invertebrates. Nighttime samples only, therefore, were used in comparing depth distributions of the aorids.

Only four species (*Lembos tigrinus*, *L. tempus*, *L. smithi*, and *L. spinicarpus*) occurred in sufficient abundance for distributional analysis, but the distributions of all aorid species are included in Table 4. Of the four abundant species, none reached greatest relative abundance at nearshore depths, although *L. smithi*, a well-known, widely distributed, shallow-water species is well represented

TABLE 4. INTRASPECIFIC DEPTH DISTRIBUTIONS OF AORID SPECIES WITHIN THE HOURGLASS STUDY AREA (NIGHTTIME SAMPLES ONLY).

Species (Total abundance)	Depth (metres) 6 N (%)*	18 N (%)	37 N (%)	55 N (%)	73 N (%)
Lembos smithi (179)	38 (21)	60 (<u>34</u>)	13 (7)	51 (28)	17 (9)
Lembos spinicarpus inermis (109)	2 (2)	10 (9)	26 (24)	45 (<u>41</u>)	26 (24)
Lembos tempus (267)	0 (0)	0 (0)	23 (9)	208 (<u>78</u>)	36 (13)
Lembos tigrinus (1584)	0 (0)	2 (<1)	6 (<1)	928 (<u>59</u>)	648 (41)
Lembos brunneomaculatus mackinneyi (2)	2 (100)	0 (0)	0 (0)	0 (0)	0 (0)
Lembos unicornis (4)	2 (50)	2 (50)	0 (0)	0 (0)	0 (0)
Rildardanus laminosa (8)	2 (25)	5 (63)	0 (0)	1 (13)	0 (0)
Lembos unifasciatus reductus (35)	0 (0)	32 (91)	2 (6)	0 (0)	1 (3)
Lembos ovalipes (2)	0 (0)	1 (50)	1 (50)	0 (0)	0 (0)
Microdeutopus myersi (11)	0 (0)	3 (27)	1 (9)	6 (55)	1 (9)
Acuminodeutopus naglei (2)	0 (0)	1 (50)	0 (0)	1 (50)	0 (0)
Liocuna caeca (3)	0 (0)	0 (0)	0 (0)	2 (66)	1 (33)
Unciola serrata (1)	0 (0)	0 (0)	0 (0)	1 (100)	0 (0)

*Depth with greatest percent occurrence of abundant species underlined.

TABLE 5. DISTRIBUTIONS OF THE FOUR MOST ABUNDANT AORID SPECIES BETWEEN THE NORTHERN AND SOUTHERN HOURGLASS TRANSECTS (NIGHTTIME SAMPLES ONLY).

Species	North Transect N (%)	South Transect N (%)	Total Abundance
Lembos smithi	125 (70)	54 (30)	179
Lembos tempus	101 (38)	166 (62)	267
Lembos spinicarpus inermis	41 (38)	68 (62)	109
Lembos tigrinus	473 (30)	1111 (70)	1584

at the 6 m stations. (The high percentage of *L. unifasciatus reductus* at 18 m may not be significant, because 28 of the 32 specimens at that depth came from a single, uncharacteristically successful dredge sample at Station J.) The remaining abundant species reached greatest relative abundance at the deeper stations in 55 and 73 m depths.

An analysis of the distributions of the four most abundant species at the northern and southern transects (Table 5) shows that whilst *L. smithi* was very much more abundant at the northern transect, *L. spinicarpus inermis*, *L. tempus*, and *L. tigrinus* all reached peak abundance at the southern transect.

The interspecific relative dominance of the four most abundant species is given in Table 6. This shows the "apportionment" of the area among the common species and their relative numerical dominance at each depth sampled. *Lembos smithi* was numerically dominant at 6 m and 18 m depths, *L. spinicarpus inermis* and *L. tempus* shared dominance at 37 m, *L. tempus* clearly dominated at 55 m, and *L. tigrinus* (the most abundant species) dominated at 73 m stations. Thus, *L. smithi*, a Transhatteran species, was most abundant at the northern stations in shallower depths, while the other three species were most abundant at the southern transect in deeper depths. This suggests that *L. tempus* and *L. tigrinus* may prove to be tropical species which, like *L. spinicarpus*, have invaded the deeper, more stable waters of the southern Gulf.

TABLE 6. INTERSPECIFIC RELATIVE DOMINANCE OF FOUR MOST ABUNDANT AORID SPECIES AT EACH DEPTH WITHIN HOURGLASS STUDY AREA, EXPRESSED AS PERCENTAGES OF TOTAL SPECIMENS (N) PER DEPTH (NIGHTTIME SAMPLES ONLY).

Species	Depth (metres) 6 N=40	18 N=72	37 N=68	55 N=1232	73 N=727
Lembos smithi	95	83	19	4	2
Lembos spinicarpus inermis	5	14	38	4	4
Lembos tempus	0	0	34	75	5
Lembos tigrinus	0	3	9	17	89

BREEDING PERIODICITY

Aorid marsupia (brood pouches) are rather delicate, eggs being retained by oostegites with fine, fringing, seta-like extensions. During the processes of catching, sieving and preserving of the amphipods, eggs are frequently lost due to disruption of the marsupium. The counting of ovigerous

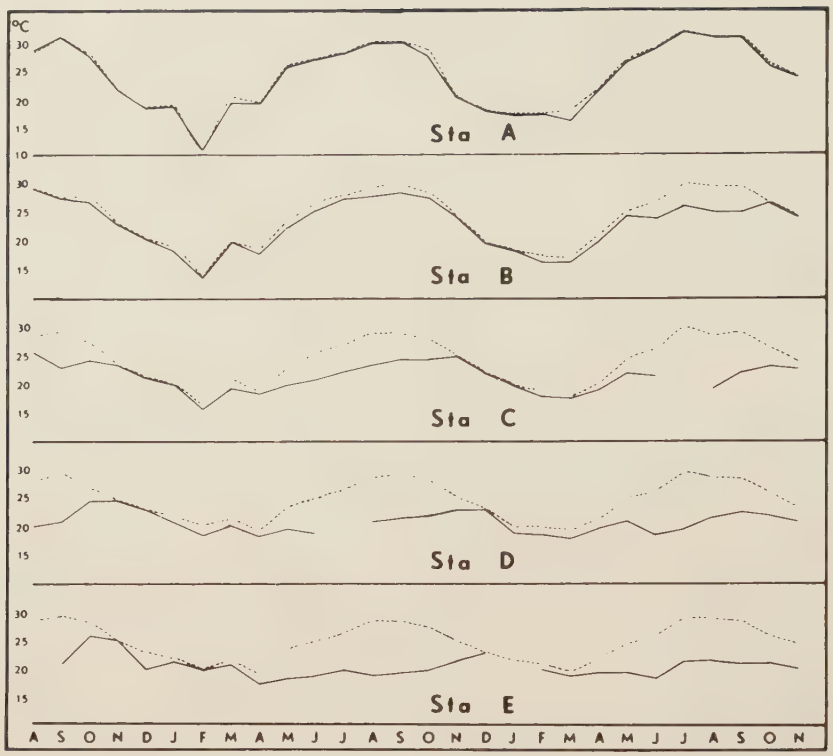

Figure 34A. Variation of monthly surface (---) and bottom(——) temperatures at Hourglass Stations A-E (After Lyons, 1970).

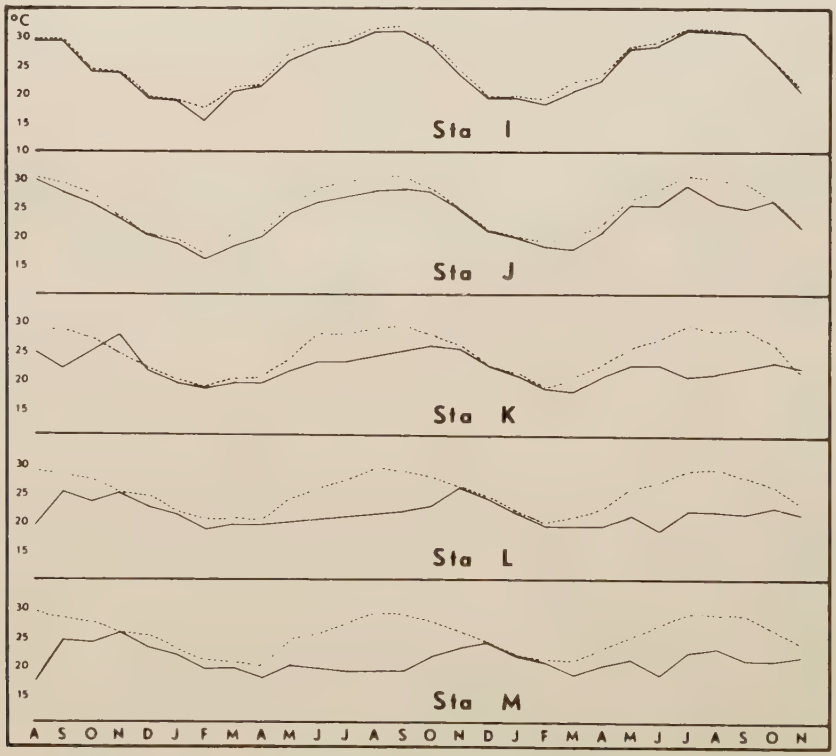

Figure 34B. Variation of monthly surface (---) and bottom (——) temperatures at Hourglass Stations I-M (After Lyons, 1970).

TABLE 7. NUMBERS OF FEMALES WITH EGGS, AND WITH WELL-DEVELOPED MARSUPIA, OF THREE MOST ABUNDANT AORIDAE COLLECTED.

	Lembos tigrinus				*Lembos tempus*				*Lembos smithi*			
	T.F.	O.F.	M.D.	%	T.F.	O.F.	M.D.	%	T.F.	O.F.	M.D.	%
Jan	44	1	7	18	5	—	1	20	3	—	3	100
Feb	48	1	12	27	13	1	4	38	7	1	2	43
Mar	61	2	11	21	9	1	4	56	16	2	8	62
Apr	5	—	1	20	14	2	2	28	12	4	5	75
May	68	1	7	12	29	2	8	34	20	3	11	70
Jne	7	1	2	43	12	1	2	25	11	2	3	45
Jly	118	—	—	—	17	1	6	41	1	1	—	100
Aug	272	10	256	98	48	3	38	85	14	—	3	21
Sep	176	1	115	66	22	2	14	73	10	—	4	40
Oct	111	1	37	34	28	1	19	71	9	—	2	22
Nov	156	3	71	47	13	1	10	85	32	—	2	6
Dec	31	1	1	6	1	—	—	—	2	—	2	100

T.F. = Total females
O.F. = Ovigerous females
M.D. = Marsupium developed

females in the samples does not therefore give an accurate picture of breeding cycles. In those species which occurred in sufficient numbers for analysis, i.e., *Lembos tigrinus*, *L. tempus*, and *L. smithi*, ovigerous females were found in small numbers throughout the year. However, by counting both ovigerous females and females with well-developed oostegites, presumed to have aborted their eggs, breeding peaks were indicated (Table 7). Both *L. tigrinus* and *L. tempus* showed a breeding peak between August and November. The majority of specimens of these two species were collected at stations with a depth of 55 or 73 m. At these depths, there is a correlation between the breeding peak and a general rise in temperature (Figures 34A, B). A breeding peak for *L. smithi* was indicated between March and May at which time all stations were experiencing low temperatures (the lowest of the year at the deeper stations, but rising after the winter low at shallow stations). The correlation of low temperatures with a breeding peak would lend some support to the theory that *L. smithi* is a Transhatteran species reaching its southern limit of distribution in the northern Gulf of Mexico.

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APPENDIX I

Monthly catches of aorid species at Hourglass stations. Subscripts 1, 2, and sp. represent regular (night), post (day), and supplementary cruises. Only species captured five or more times tabulated.

Lembos ovalipes

STA	1965					1966													1967										TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1																														1	1
B_2																								3						1	4
C_1																									1						1
C_2																								1							1
D_1																															
D_2																															
E																															
I																															
J																															
K																															
L																															
M																															
TOT																								4	1					2	7

Lembos smithi

STA	1965					1966													1967										TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																							1	7		1			4		13
B_1	1					1	2	1										1	8		2	3	1	2	3		2			13	40
B_2																1		2	1				4	2	1		7	3		1	22
C_1										1								1				1							1		4
C_2								2														1							1	1	5
D_1							2	1									2				7	12	6	2	4			12	2	1	51
D_2								3						1								2			10		5		3	15	39
E																											1	8	6	2	17
I							2	2																18			1	1		1	25
J										1								2				2	4	1		1				9	20
K																							3		1		2	3			9
L																															
M																															
TOT	1					1	6	9		2				1		1	2	6	9		9	21	19	32	19	2	18	27	17	43	245

Lembos spinicarpus inermis

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1							1															1		3			3			1	9
B_2																					1							1			2
C_1																		1	1		2	3			7	1		1			16
C_2																								11		2			1	2	16
D_1																												2	1		3
D_2																															
E																	9	3											1		13
I	1																							1							2
J																	1														1
K																		2						1	1	2		1		3	10
L															3	2						2			1		6	9	1	18	42
M															12			1													13
TOT	1						1								15	2	10	7	1		3	6		16	9	5	9	14	4	24	127

Lembos tempus

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1																															
B_2																															
C_1																								1				1	1	1	4
C_2								1														1								1	3
D_1					1			1									1			1	5	4	21	3	2		1	18	22		80
D_2			1				1	4		33		2		1		2					12	6	1	2	7	4	4	3	5	11	99
E						4																		1			12				17
I																															
J																															
K																		1							1			10		7	19
L												1		3	8	2					5	3			9	19	63	4	9	2	128
M															4				6					3		3	3				19
TOT			1		1	4	1	6		33		3		4	12	4	1	1	6	1	22	14	22	10	19	26	83	36	37	22	369

Lembos tigrinus

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1																						2									2
B_2																						1									1
C_1																															
C_2																															
D_1																		3			17	8	11	9	12		22	148	48	2	280
D_2										58							3	3			6	9	2	6	18		11	4	17	36	173
E						1	2		1				1	1			55	17	9	11	1	15		2	1		50	18	5	1	191
I																															
J																															
K																		6													6
L				1											22	14	8	9	10		7	17		9		80	278	59	42	92	648
M						4	3					4		1	33	7	20	2	39		39	35	7		9	111	78	8	46	11	457
TOT				1		5	5		1	58		4	1	2	55	21	86	40	58	11	70	87	20	26	40	191	439	237	158	142	1758

Lembos unicornis

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1																					1										1
B_2																					1			1	1		1				4
C_1																															
C_2																															
D_1																															
D_2																															
E																															
I																														2	2
J																														1	1
K																															
L																															
M																															
TOT																					2			1	1		1			3	8

Microdeutopus myersi

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A																															
B_1																														1	1
B_2																															
C_1																															
C_2																											3				3
D_1																															
D_2																											1				1
E																															
I																														3	3
J																										1					1
K																											1	1		1	3
L																															
M																										1	2	4		5	12
TOT																															

Rildardanus laminosa

STA	1965					1966													1967											TOT
	A	S	O	N	D	J	F	M	A	M	J	J	J sp	A	S	O	N	D	J	J sp	F	M	A	M	J	J	A	S	O	N	
A															1									1							2
B_1						1																		1						1	3
B_2																											1				1
C_1																															
C_2																						1									1
D_1																											1				1
D_2																															
E																															
I																							1							1	2
J																															
K																															
L																															
M																															
TOT						1									1							1	1	2			2			2	10

PLATE I

A. *Lembos brunneomaculatus mackinneyi* Myers; male.

B. *Lembos tempus* Myers; male.

C. *Lembos unicornis* Bynum and Fox; male.

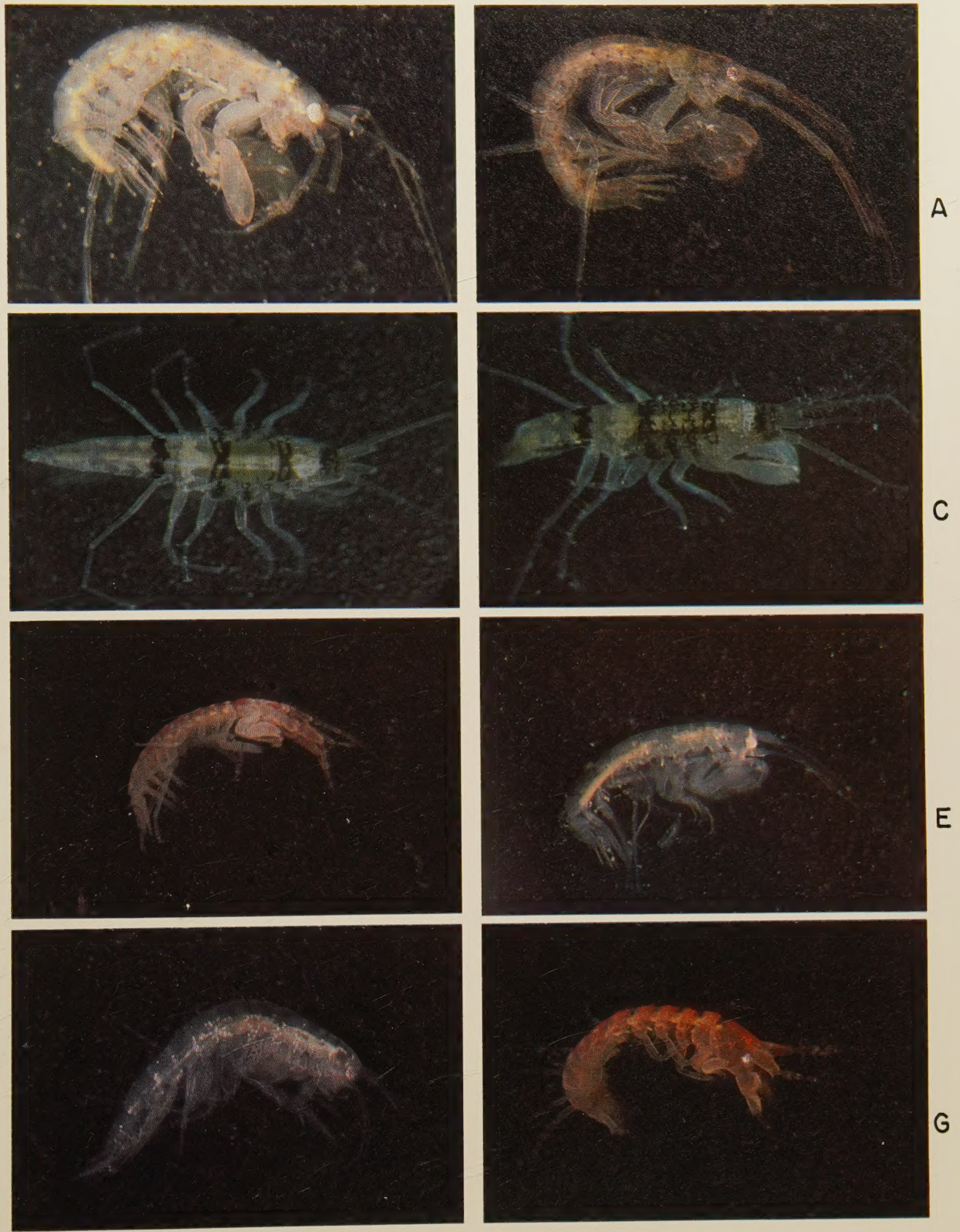
D. *Lembos unicornis* Bynum and Fox; ovigerous female.

E. *Lembos ovalipes* Myers; male.

F. *Unciola serrata* Shoemaker; male.

G. *Rildardanus laminosa* (Pearse); female.

H. *Acuminodeutopus naglei* (Bousfield); female.


B
A
D
C
F
E
H
G